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Vol. XVII JULY, 1921 No. 7

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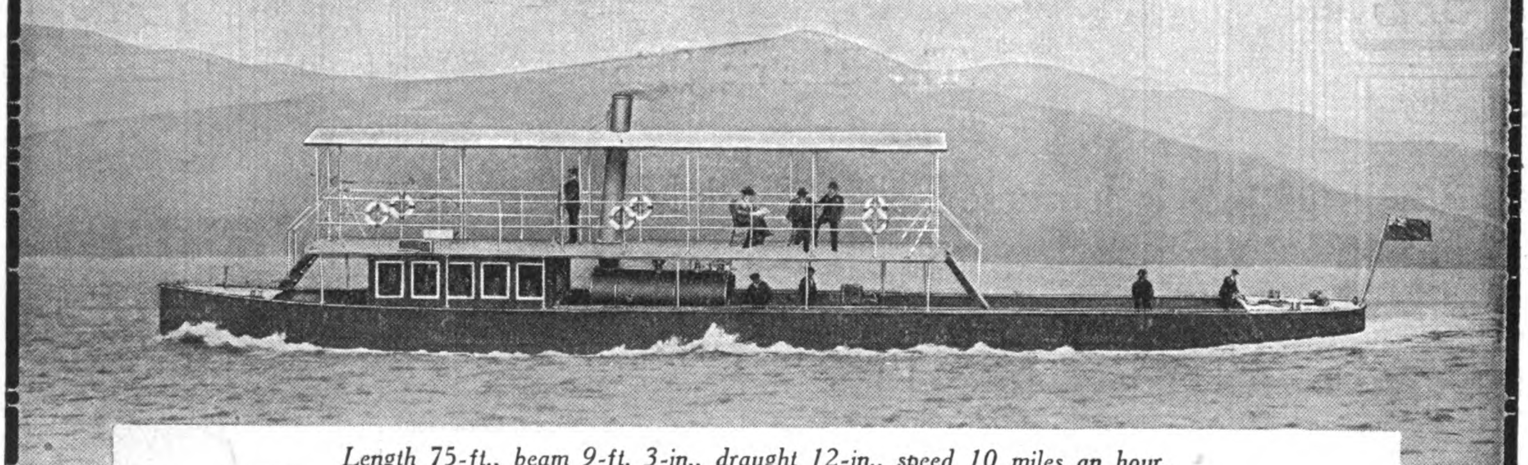

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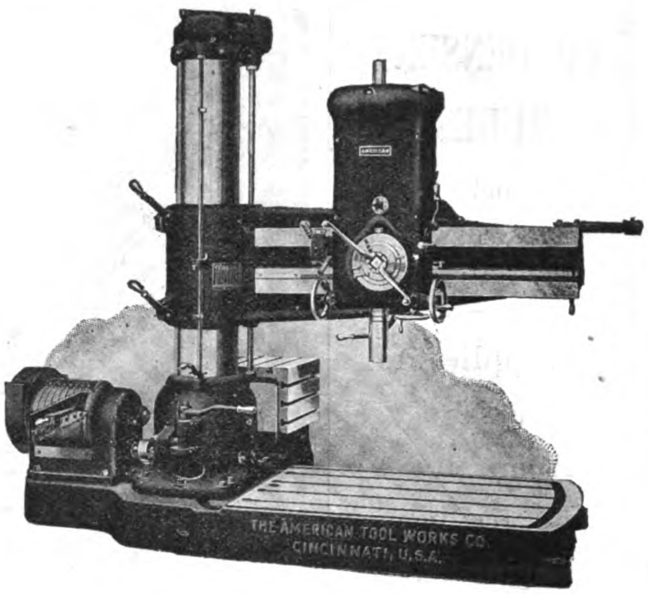

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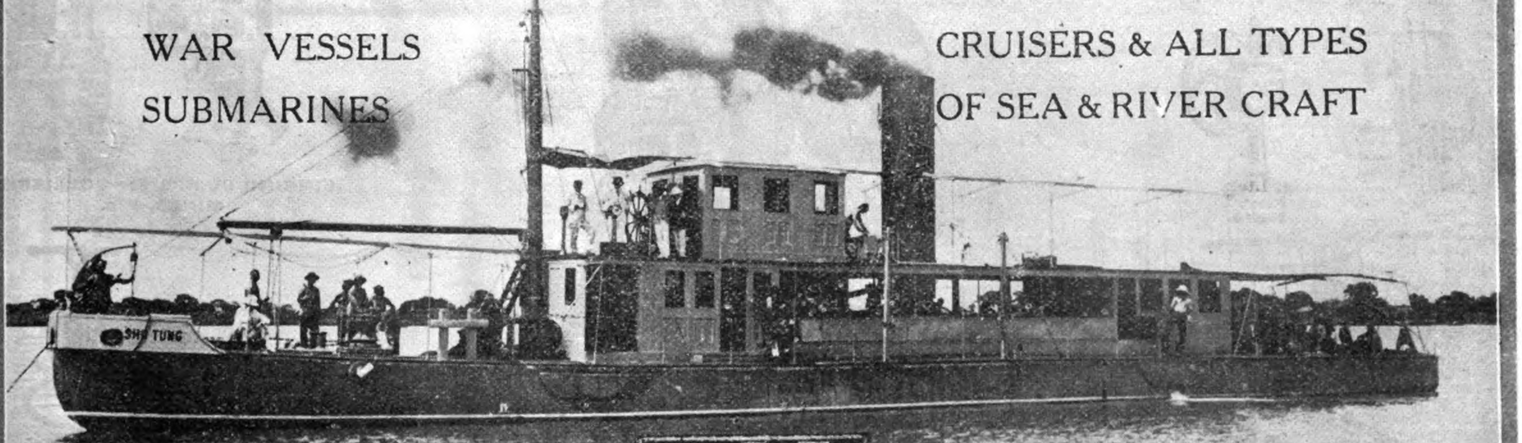

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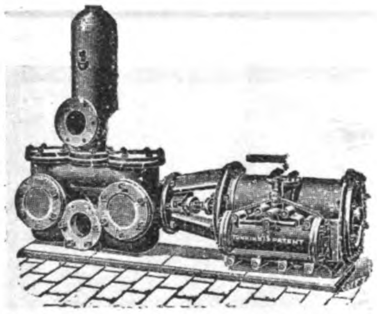

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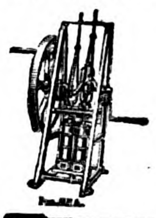

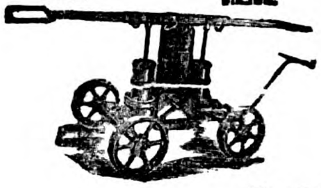

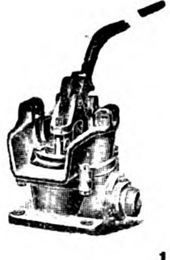

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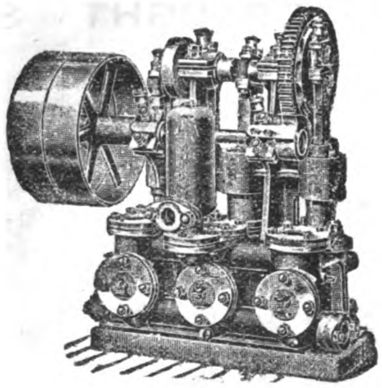

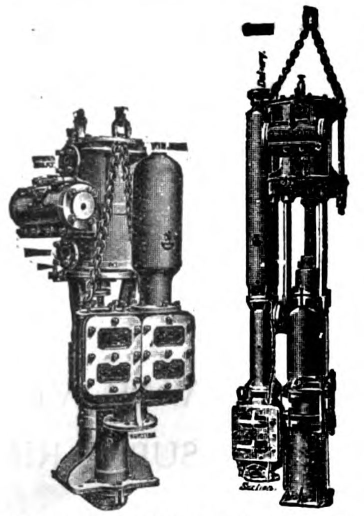

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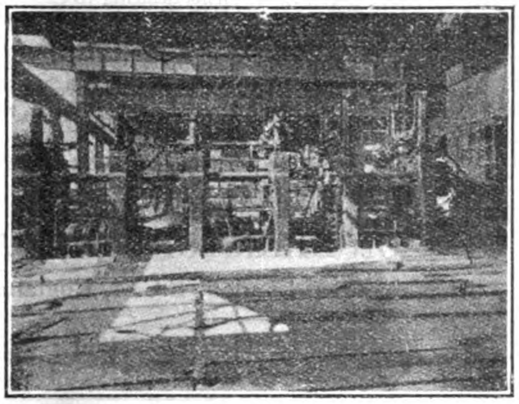

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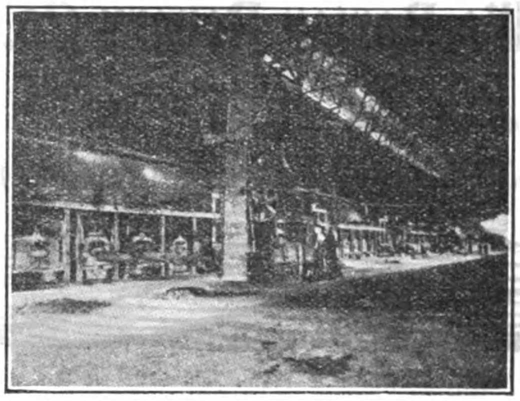

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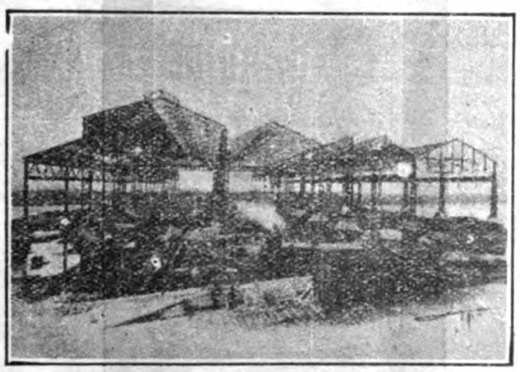

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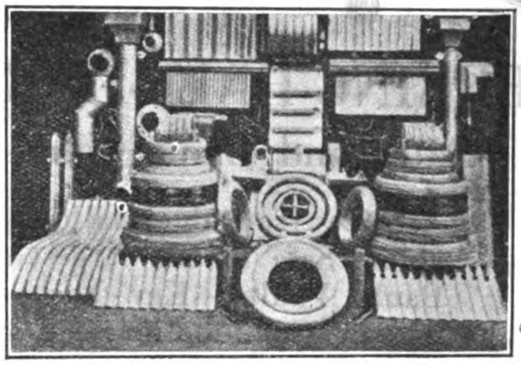

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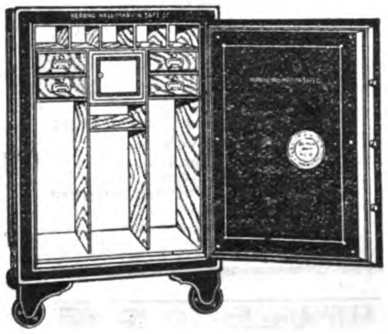

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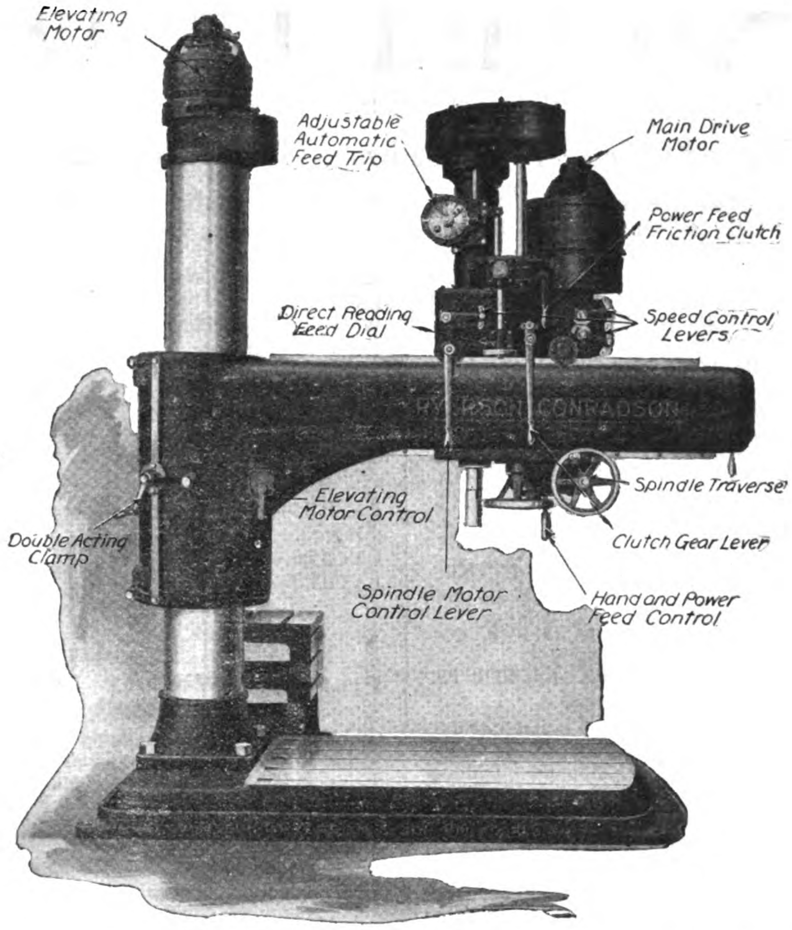

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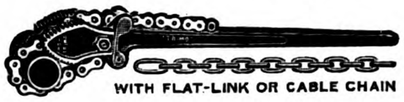

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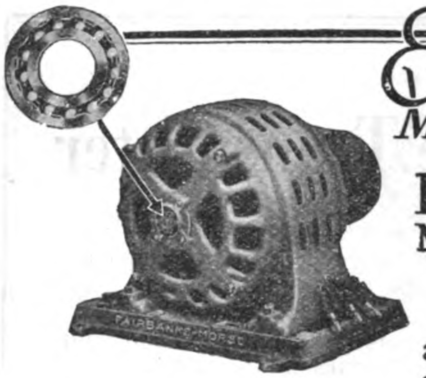

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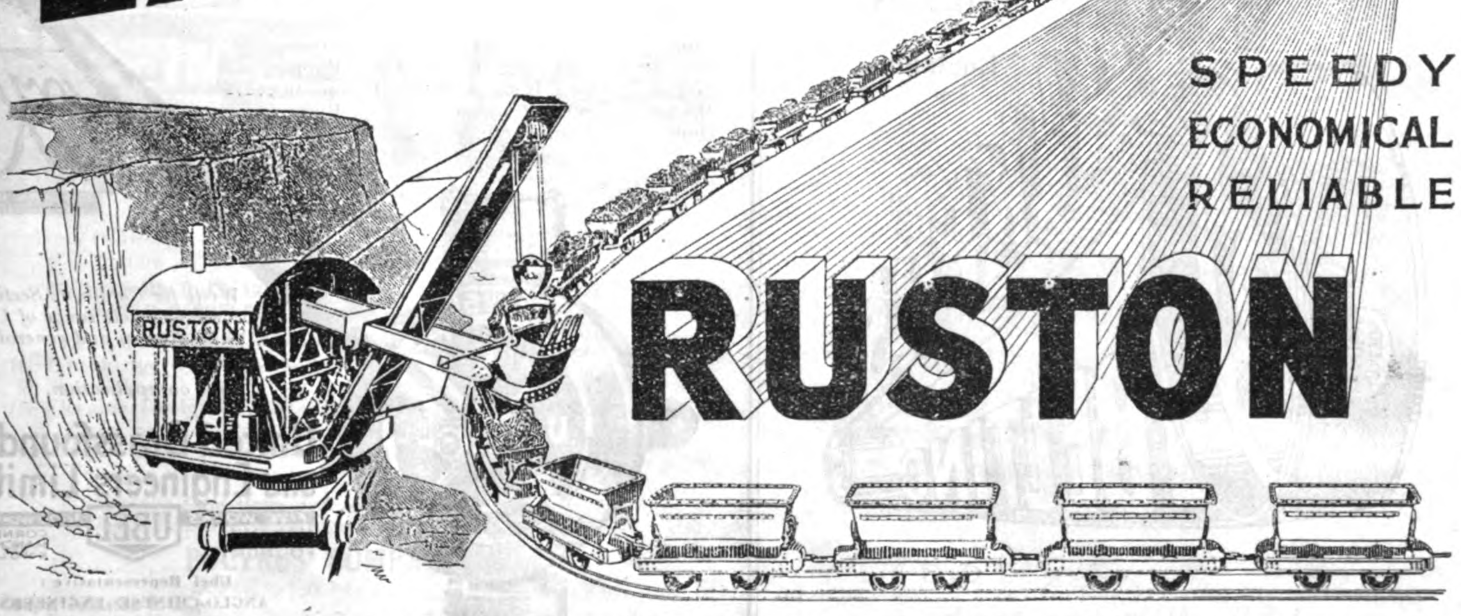

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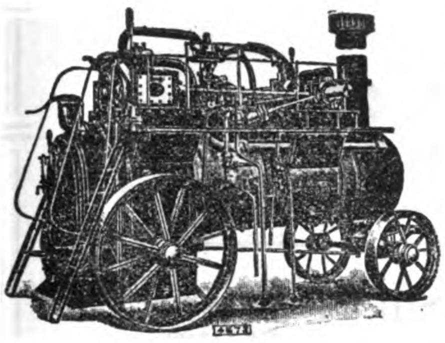

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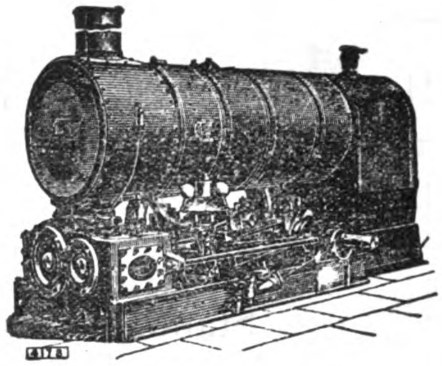

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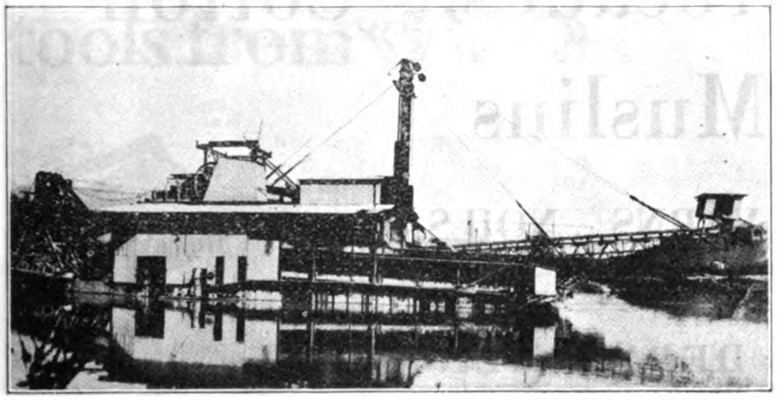

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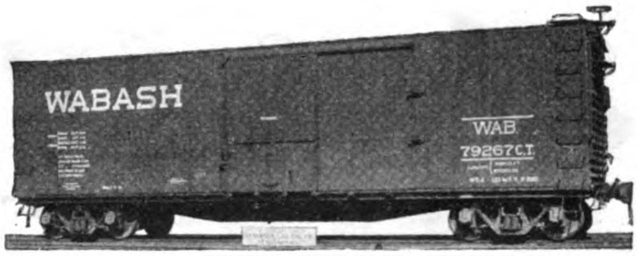

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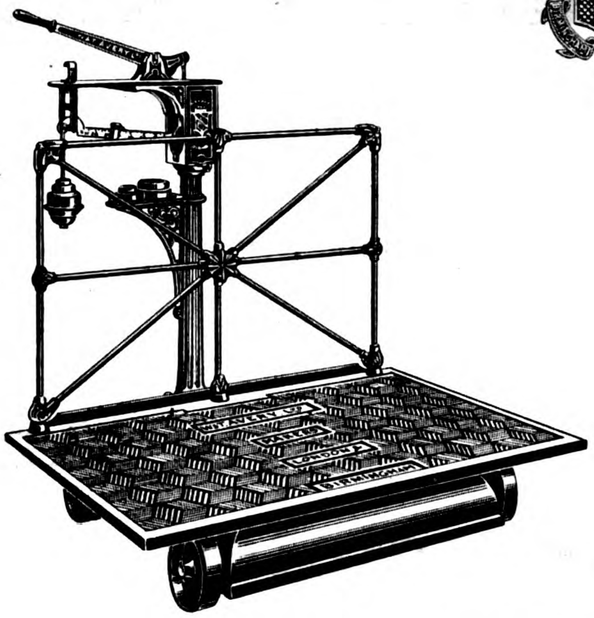

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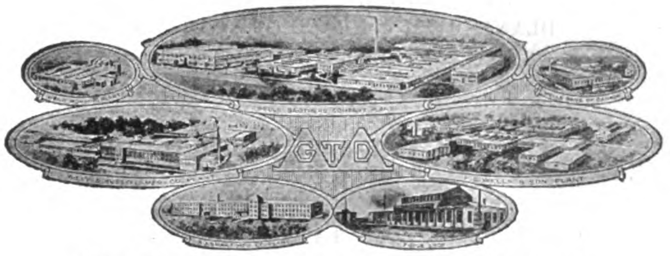

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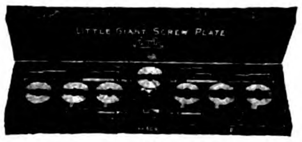

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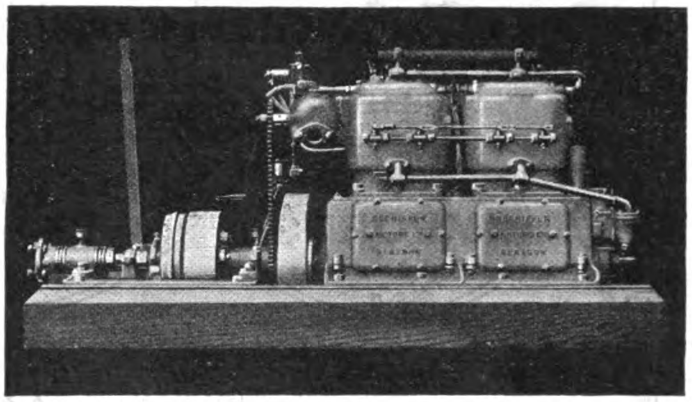

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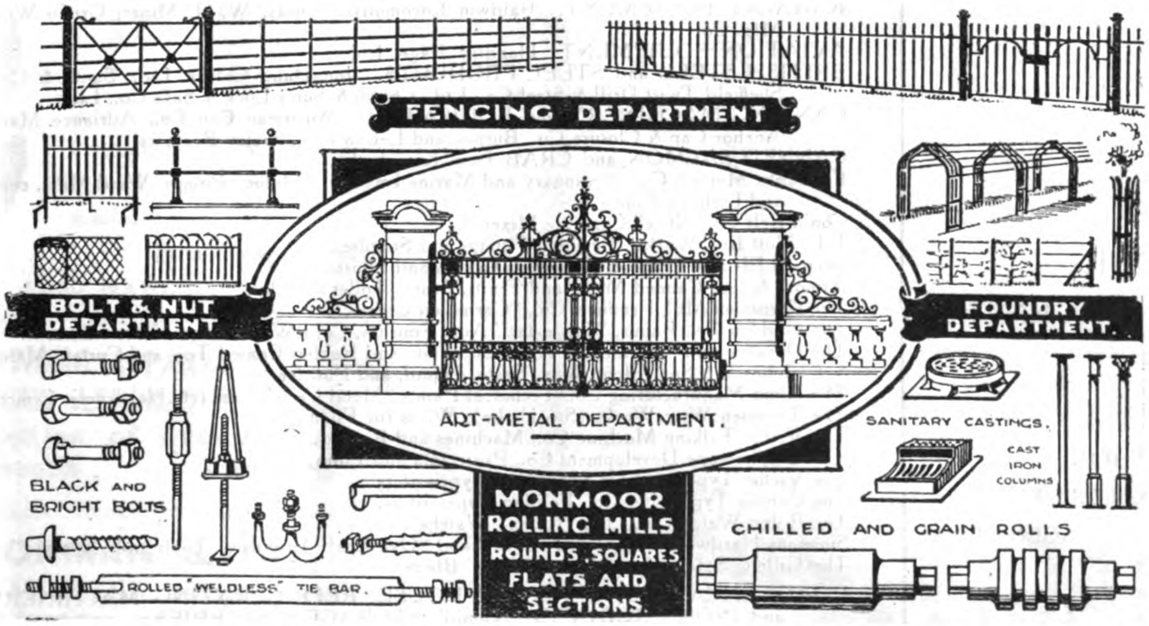

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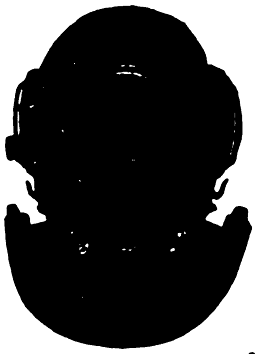

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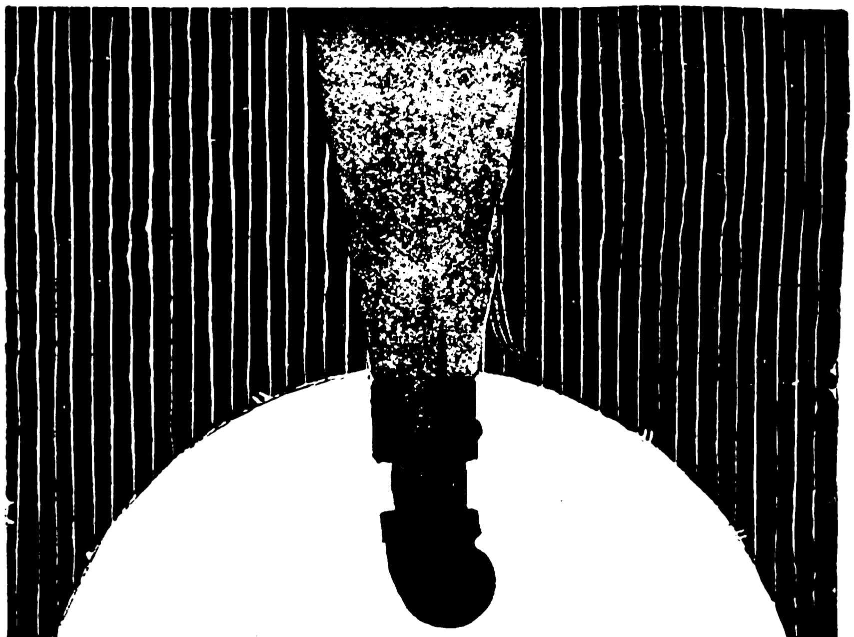

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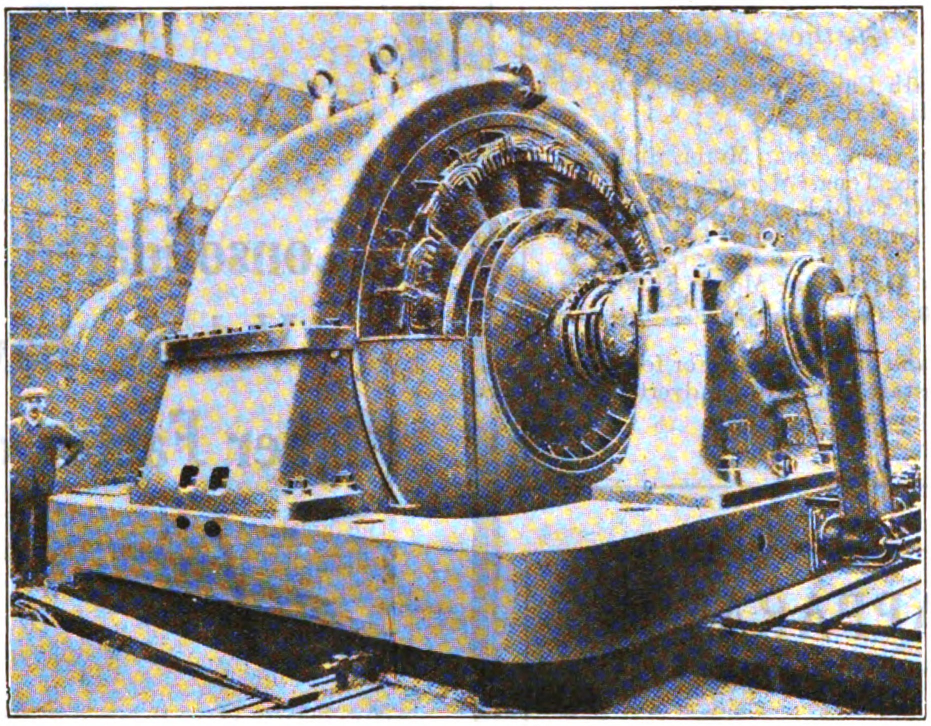

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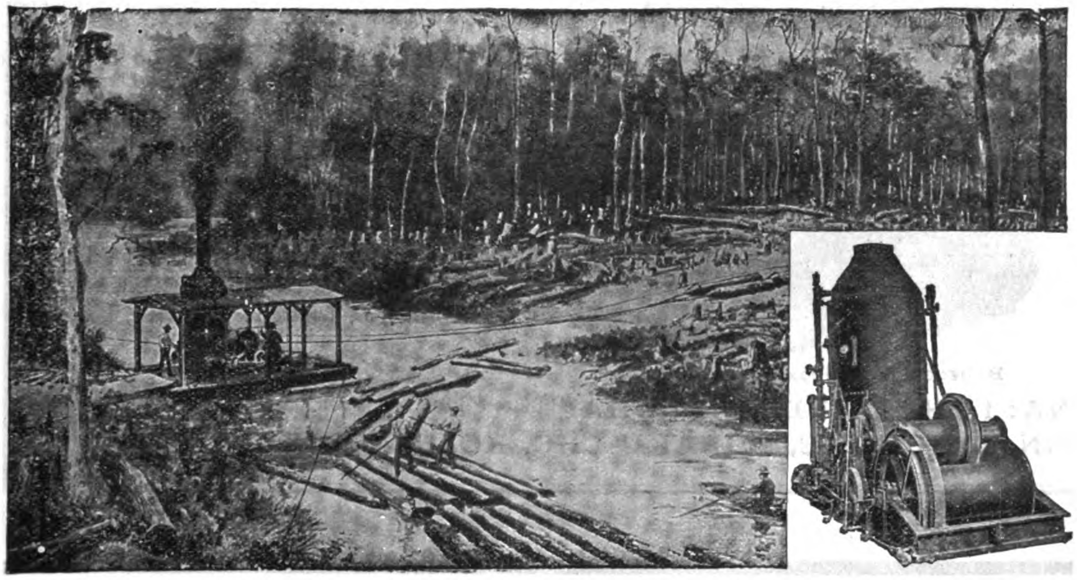

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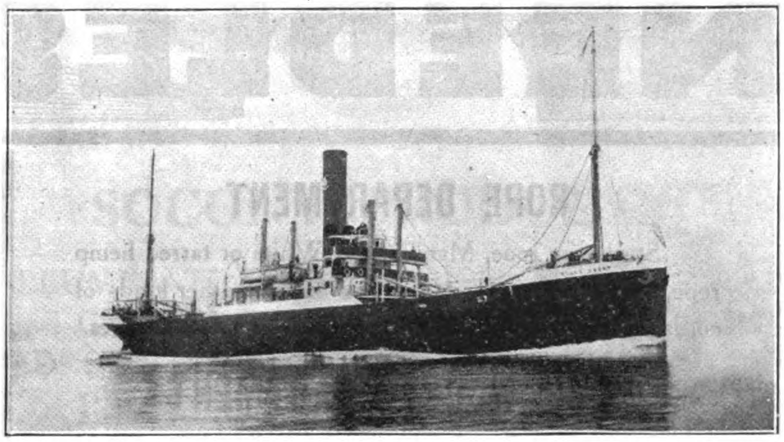

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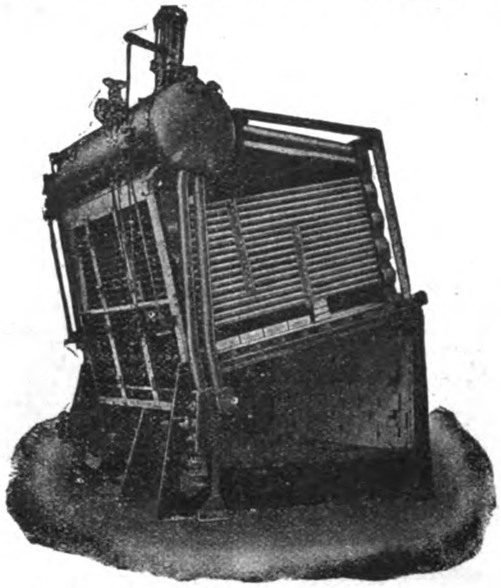

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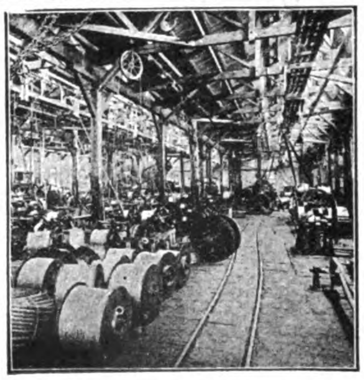

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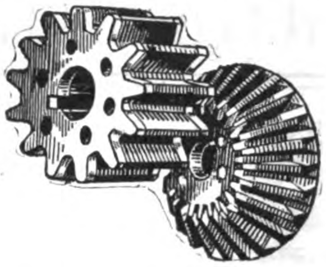

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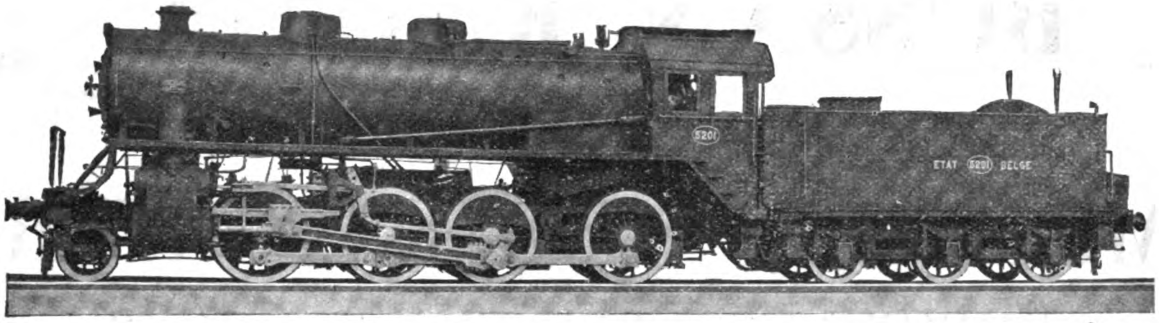

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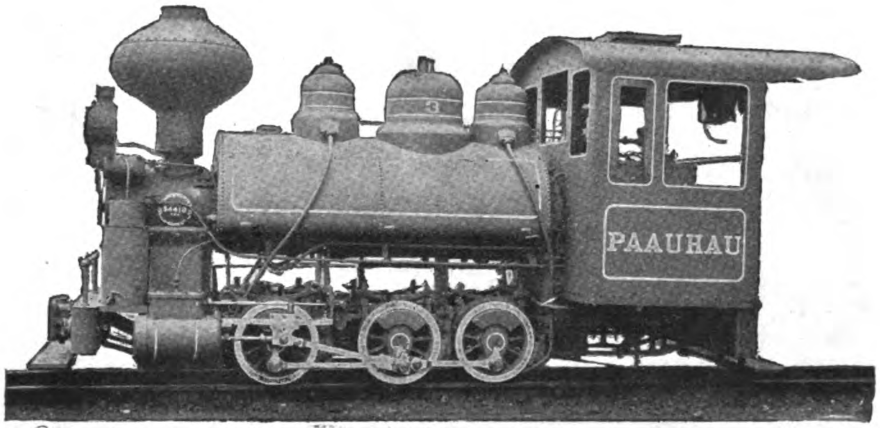

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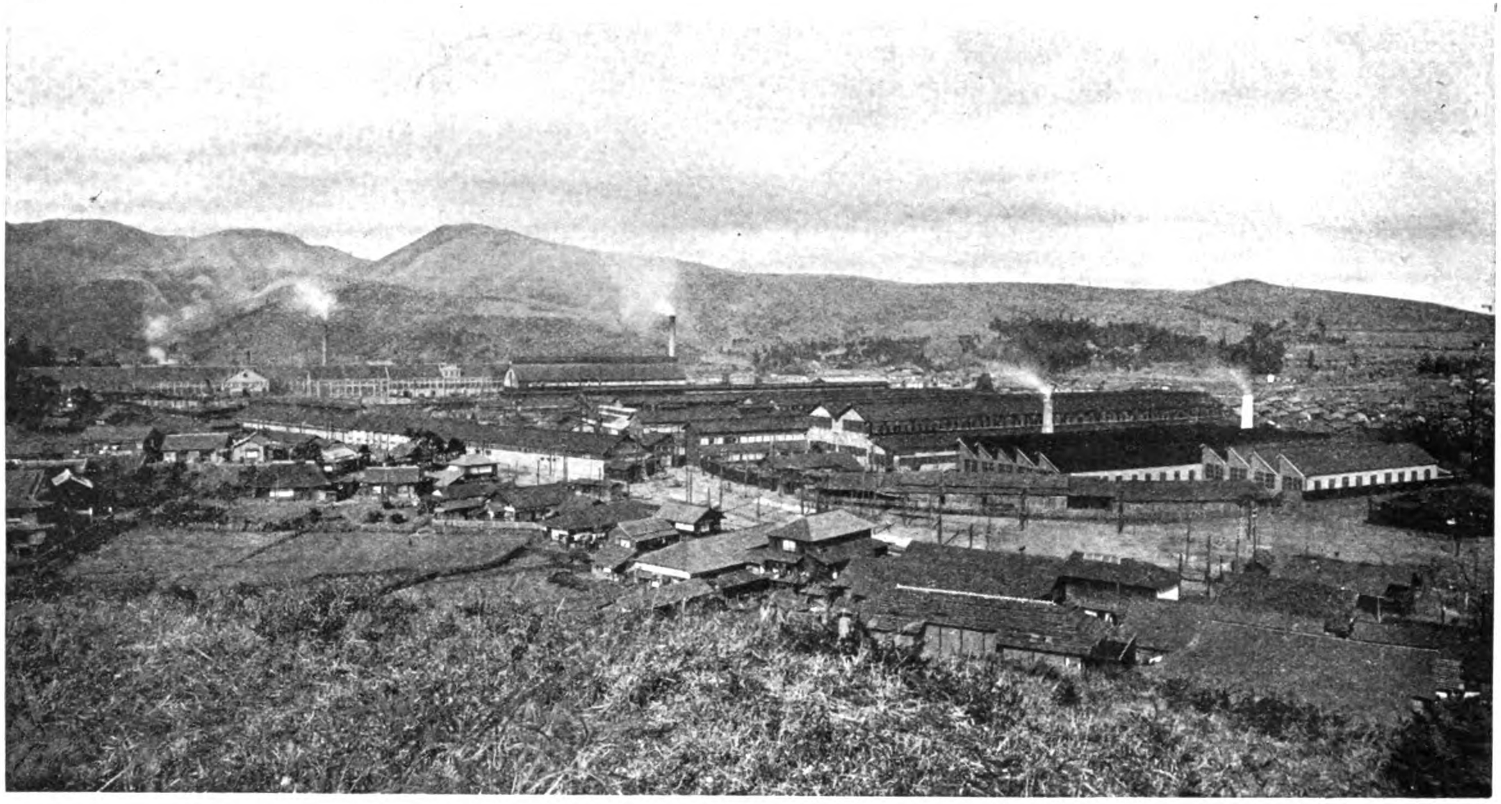

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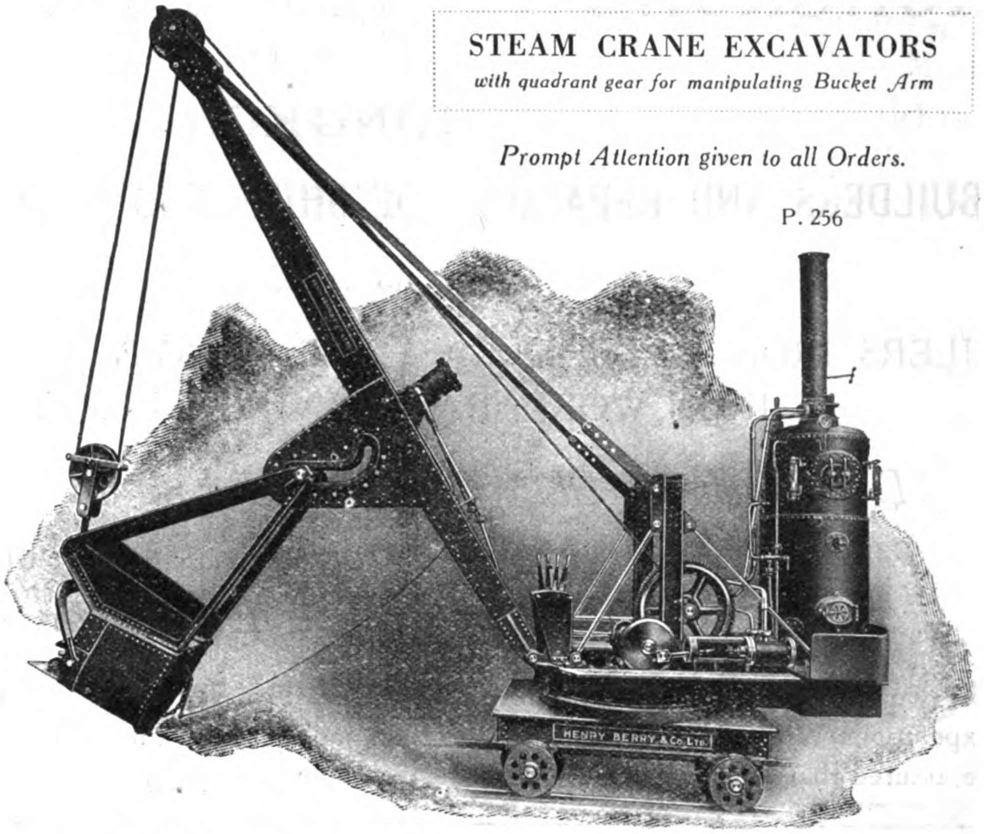

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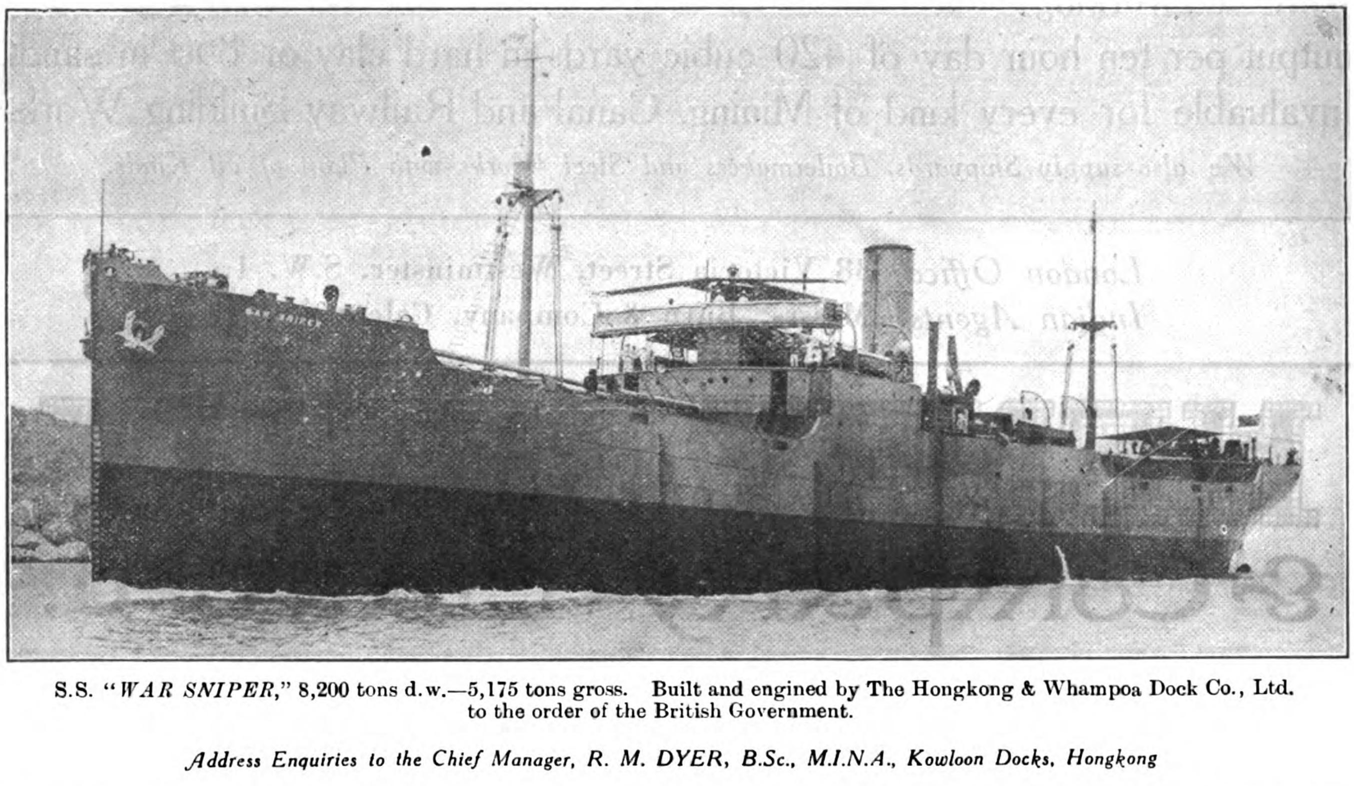

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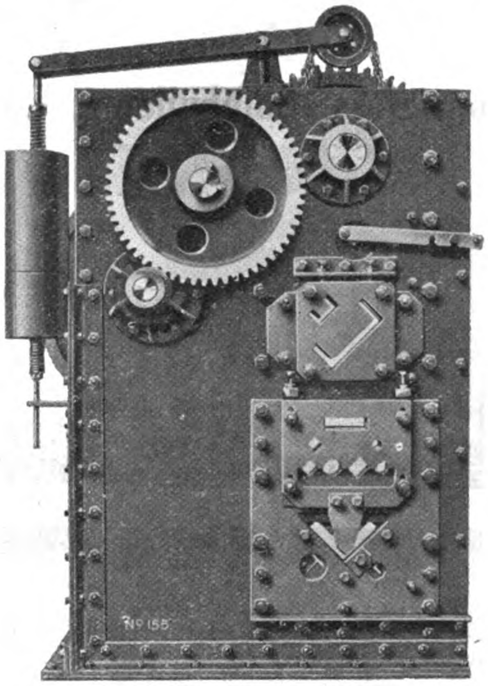

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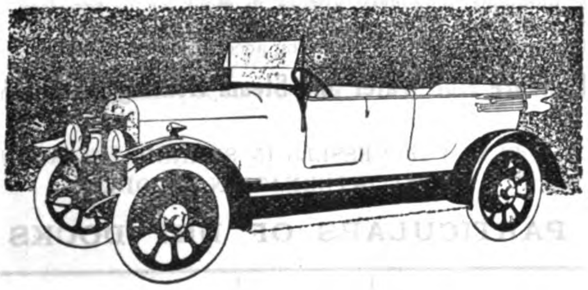

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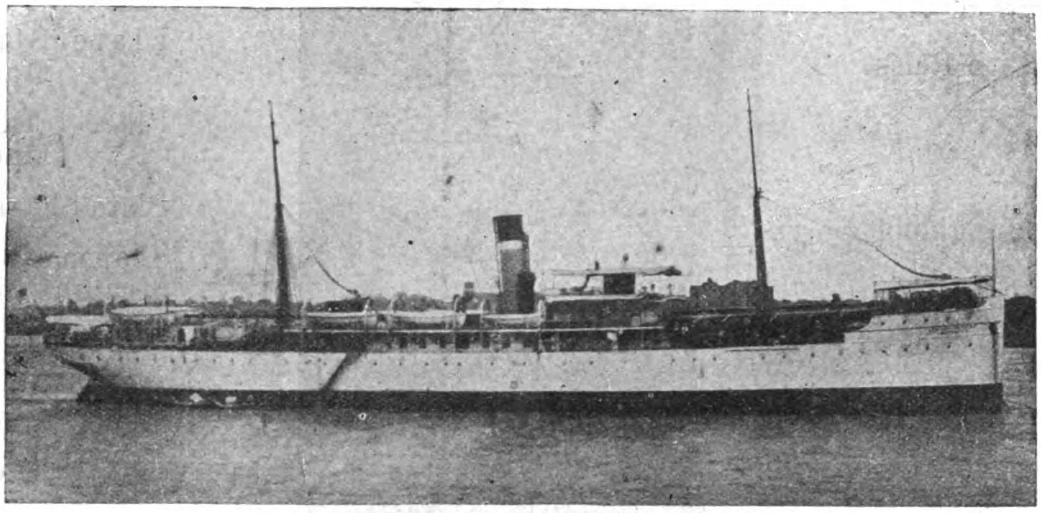

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The "Merritt" is one of Twenty-Seven Steam Vessels built during the last few years to the order of The American Government for service in the Philippine Islands.

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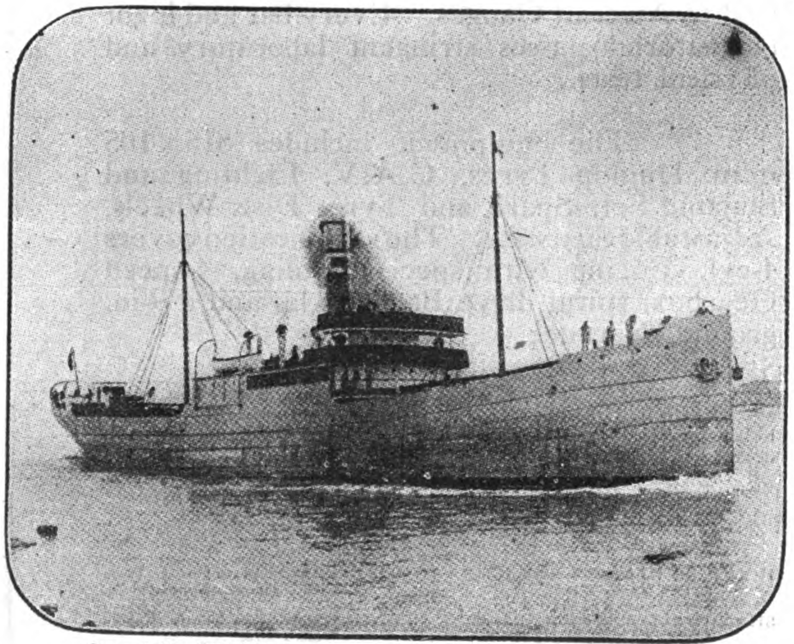

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International Dock ...	528 ,,	77 ,,	23 ,,
New Dock	450 ,,	74 ,,	21 ,,
Old Dock	399 ,,	53 ,,	16 ,,
Tunkadoo Dock ...	350 ,,	67 ,,	16 ,,

Berths for Building Steamers up to 10,000 tons Deadweight Capacity.

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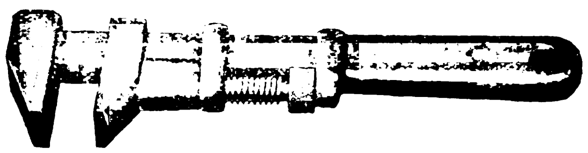

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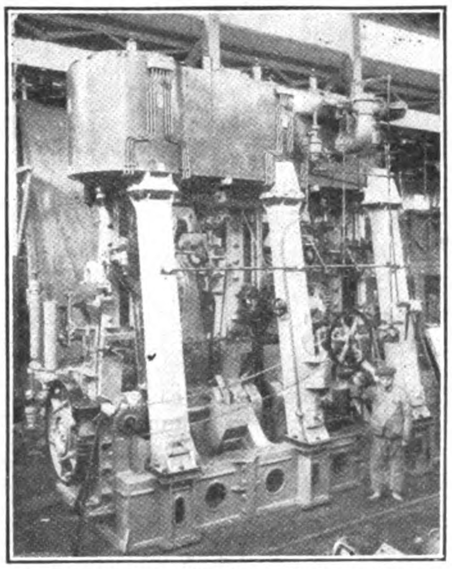

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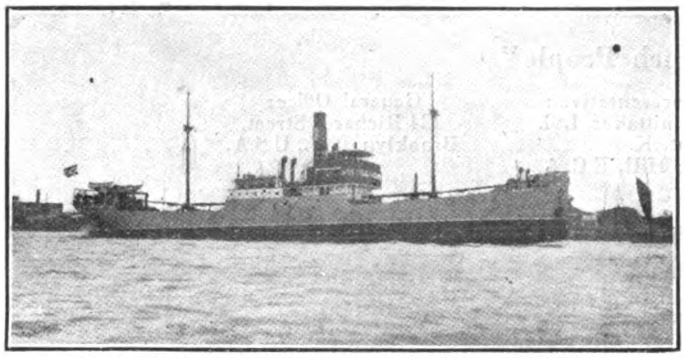

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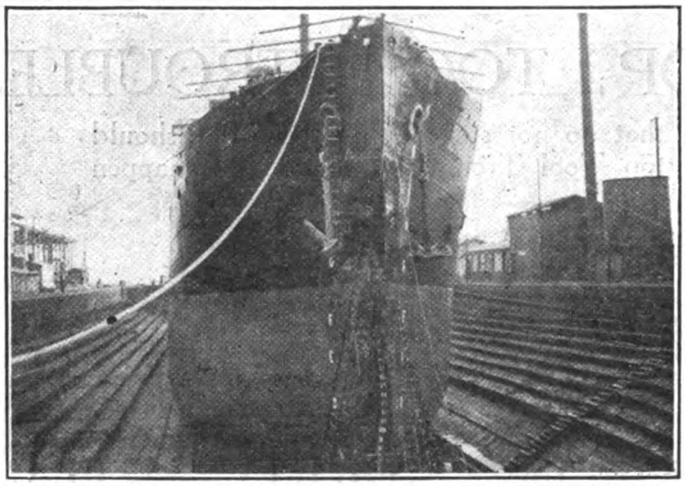

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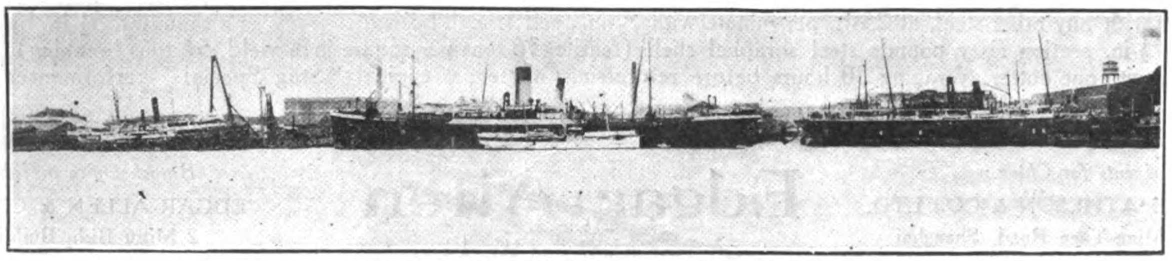

General View of Works from River Side

Showing 8 Steamers Berthed Alongside Undergoing Repairs.

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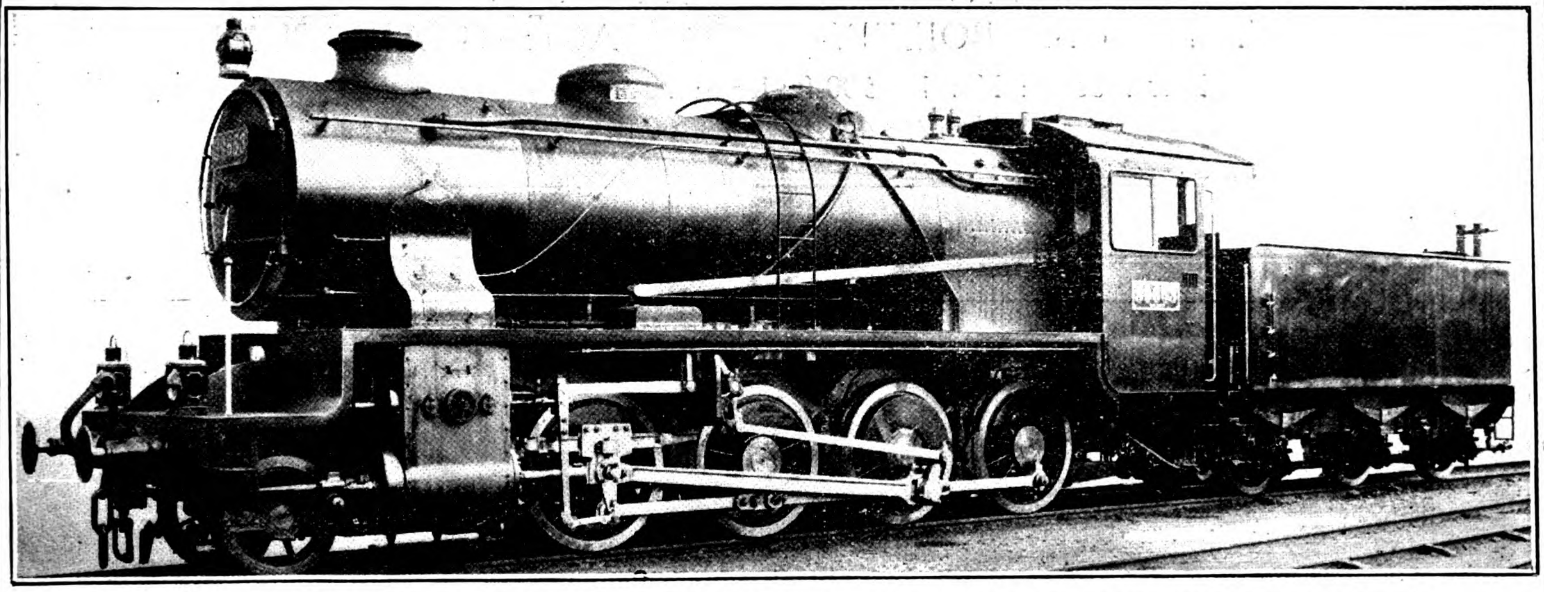

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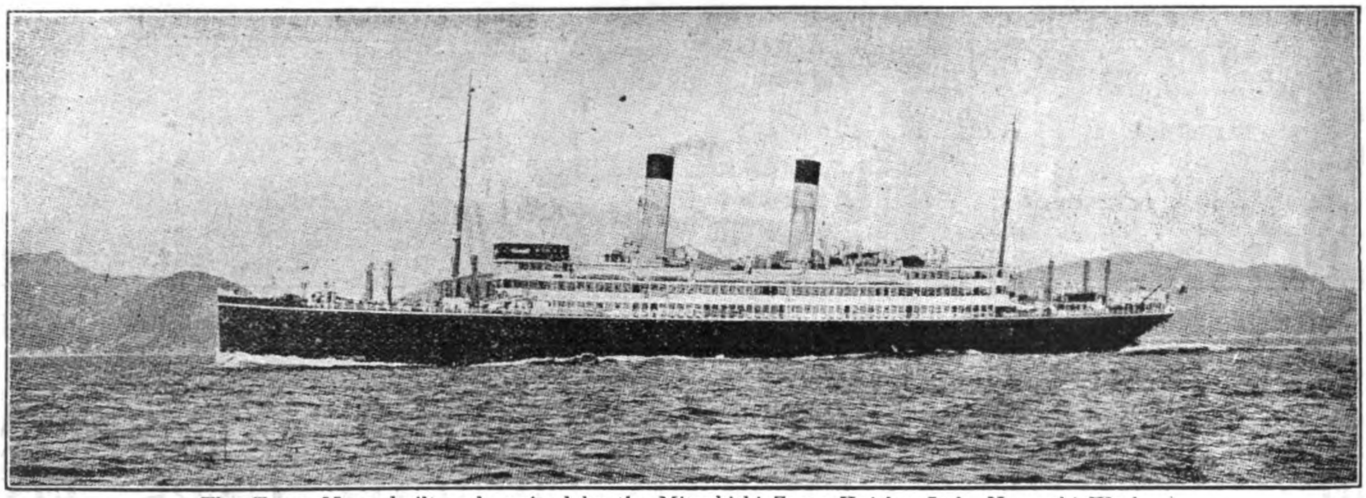

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Extreme Length	523	Ft.
Length on Blocks	513	,,
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,, ,, ,, ,, Bottom	77	,,
Water on Blocks at Spring Tide	$26\frac{1}{2}$	,,

DOCK No. 2

Extreme Length	371	Ft.
Length on Blocks	350	,,
Width of Entrance on Top	66	,,
,, ,, ,, ,, Bottom	53	,,
Water on Blocks at Spring Tide	24	,,

DOCK No. 3

Extreme Length	728.9	Ft.
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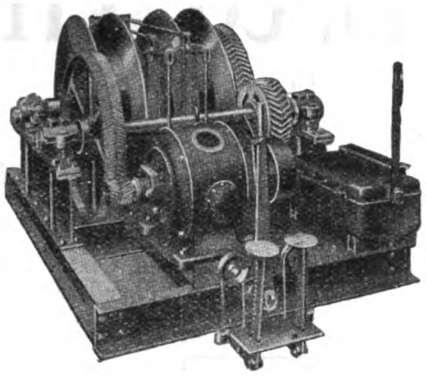

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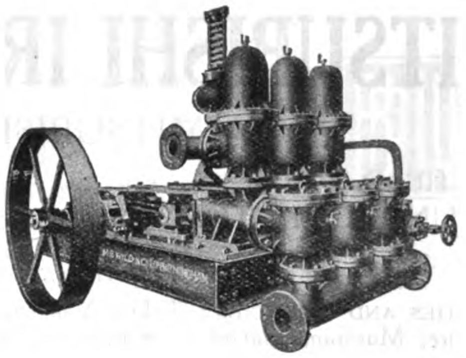

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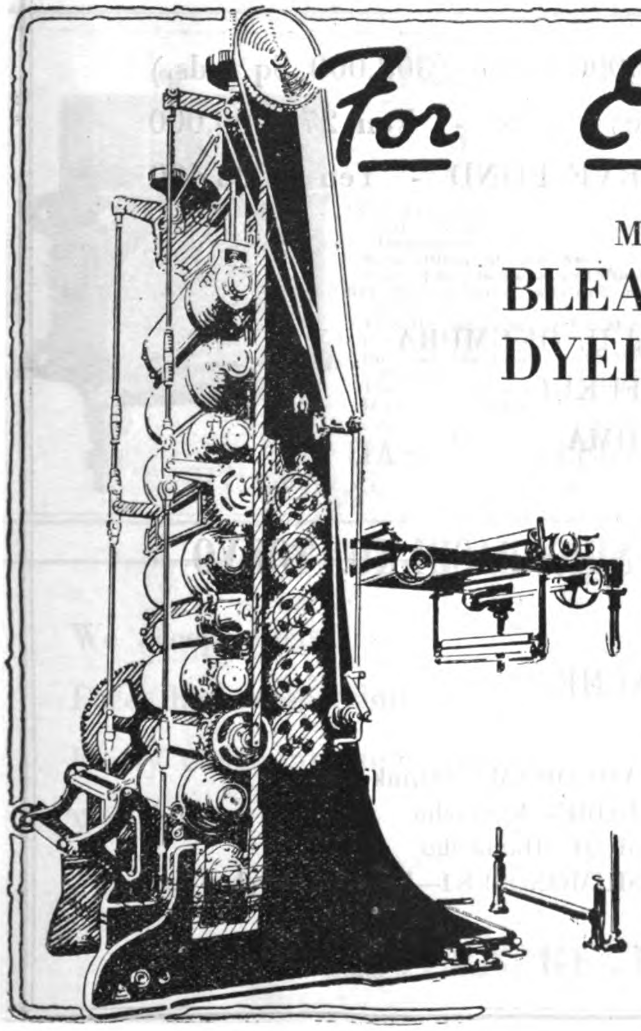

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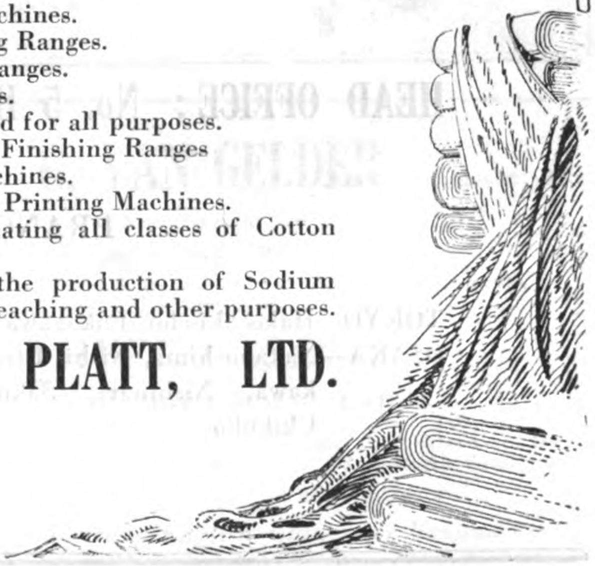

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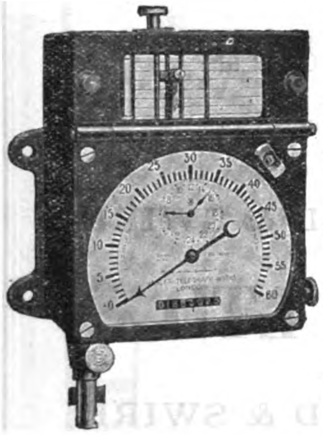

TELOC TYPE

Chart Feed on a Mileage Basis of 10 m/m per Mile.

INDICATES :—Speed.
Total mileage since application of Instrument.
Total mileage of each run.
Time of Day in Hours and Minutes.
RECORDS :—Speed attained at any point of run.
Time the engine or coach is at work.
Distance covered.
Duration (up to 24 hours) and point of stops.
Time of Day in Hours and Minutes.
If desired apparatus to record working of Westinghouse or Vacuum Brakes.

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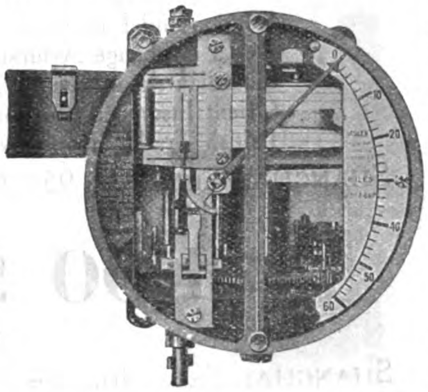
Chart Feed on a Time Basis of 4 m/m per Minute.

INDICATES :—Speed.
RECORDS :—Speed attained at any point of the run.
Time the engine or coach is at work.
Distance covered.
Duration and point of stops.
If desired bell can be fitted to ring at predetermined speed, or apparatus to record working of Westinghouse or Vacuum Brakes.



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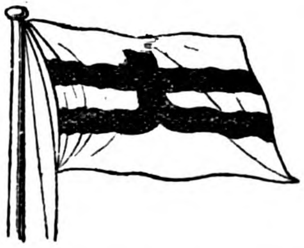

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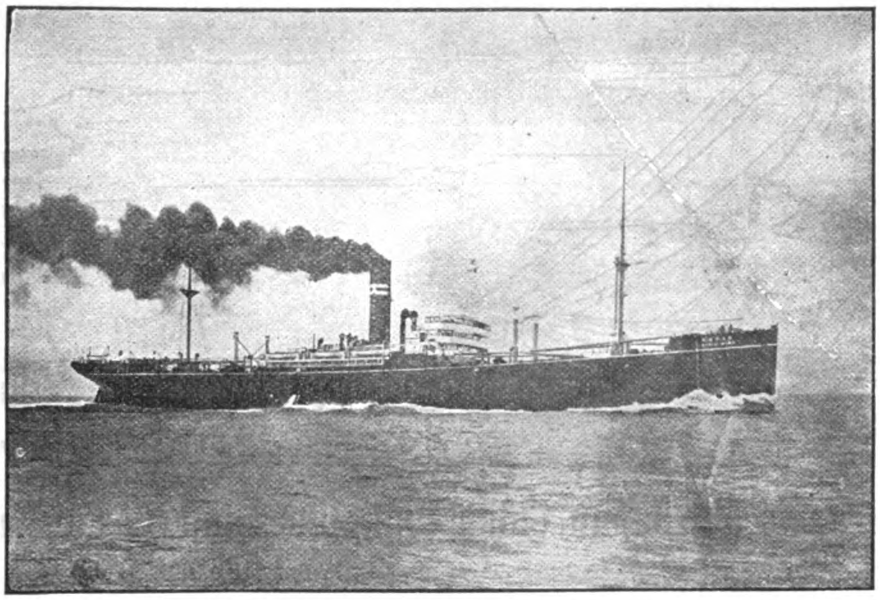

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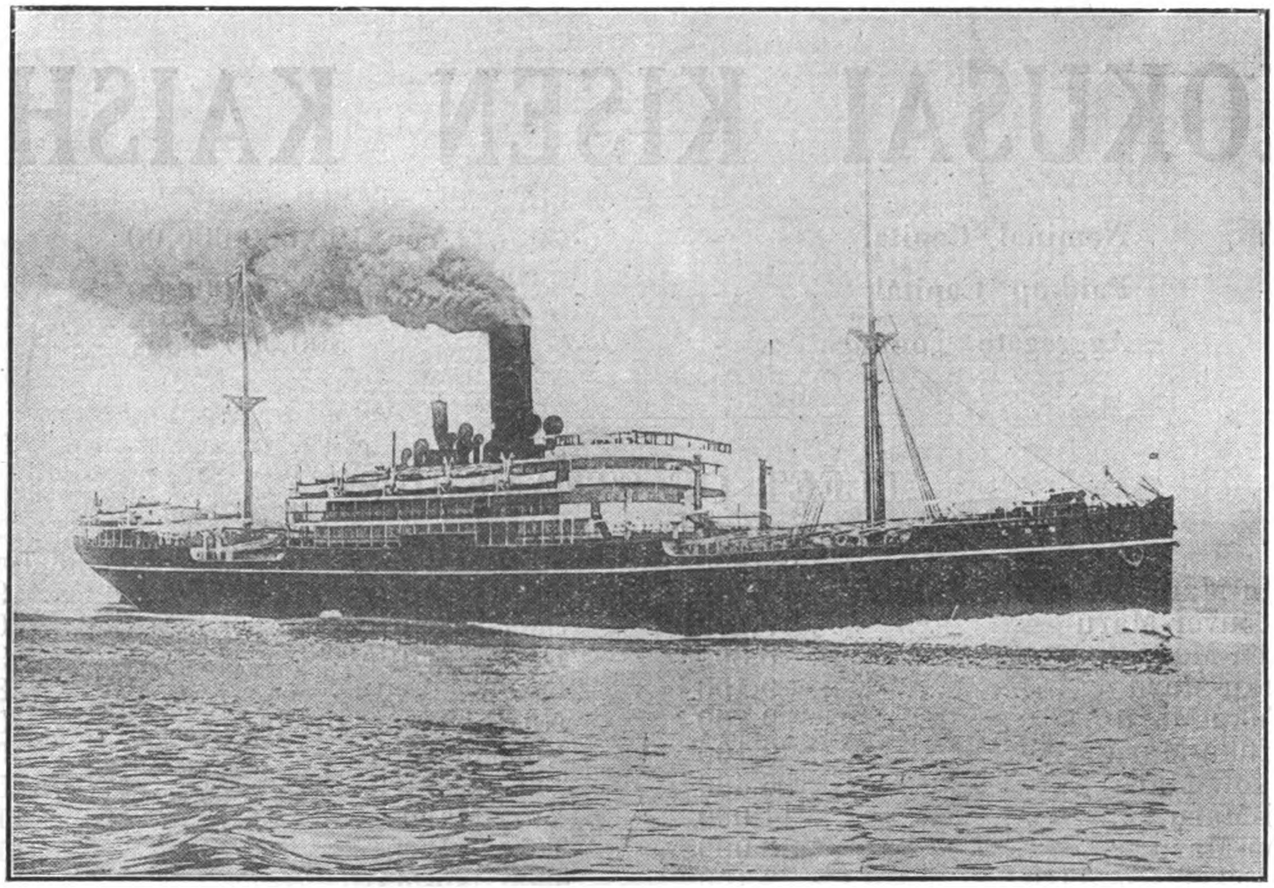

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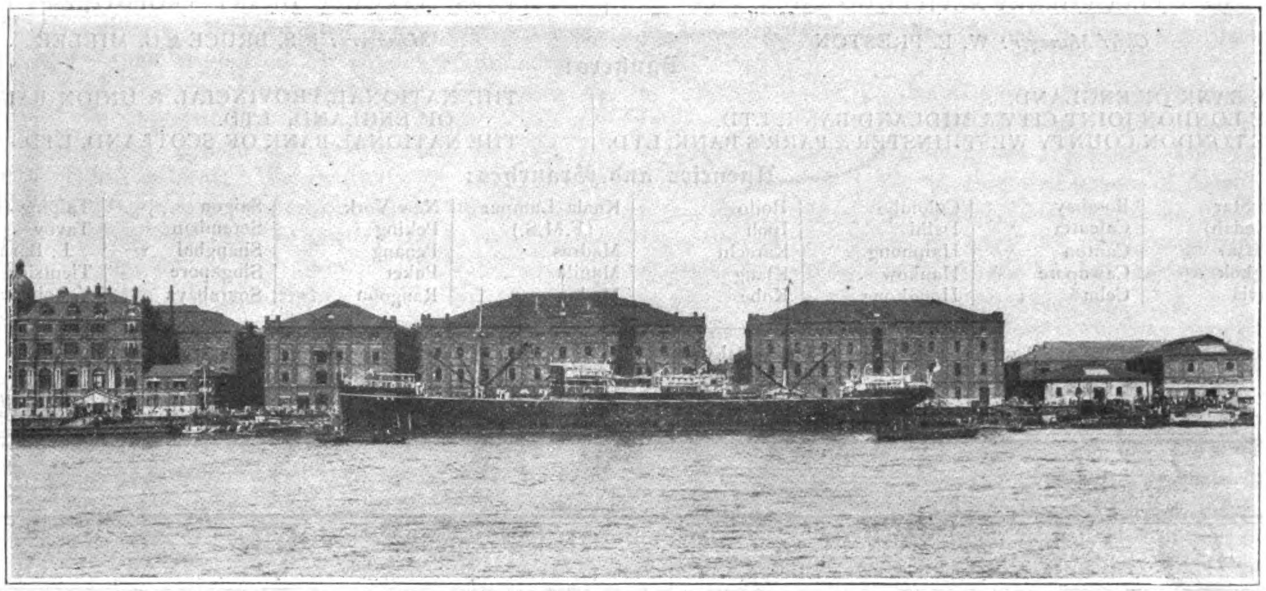

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The Far Eastern Review

ENGINEERING FINANCE COMMERCE

VOL. XVII SHANGHAI, JULY, 1921 No. 7

An American Solution to Japan's Problem

THERE appeared in the October, 1920, number of THE FAR EASTERN REVIEW, an exhaustive article on the racial problem in the Pacific, which, in brief, pointed to Japan's necessity of finding an outlet for her surplus millions. It advocated a new understanding between China and Japan supported by Great Britain, France and America, under whose terms China would be called upon to assume her share of the responsibility of assuring to her own and Japan's unborn millions the right to exist within lands set aside by nature as their peculiar habitat. We pointed out that Russia has annexed the waste lands and snuffed out the independence of the "little peoples of Asia," in order to gratify the Romanoff lust of conquest, and, in pursuit of her basic "Monroe Doctrine," excluded the Asiatic from his birthright. This policy resulted in prodding the yellow man over the sea to find an outlet, thus creating the racial issue in Canada, America, New Zealand, Australia, South Africa and elsewhere. As long as Russia retains possession of these Asiatic Alsace Lorraines and applies her policy of exclusion, the Japanese must perforce seek their future over the sea. We see no good reason why the youth of America and the British Dominions should be called upon to settle this issue in the Pacific in order to consolidate Russia's sway over vast territories in Asia stolen from the yellow man and now urgently required for his expansion. Some nation must sooner or later face this question. We see no reason why it should be America. Americans have no business in Siberia or in Manchuria or in Mongolia. We agree with the *Boston Transcript* in that "American economic flirtation with the resources of Siberia, while Alaska lies undeveloped at our doors, seems to be decidedly a case of the fields being green that are far away." Russia has no urgent need for these territories. Such development as she has carried out in these regions has been based upon purely strategical grounds, to provide facilities for further conquests. The time is not far away when the world must face the consequences. If Russian policy prevails, if the United States, in addition to maintaining the Monroe Doctrine, is to gratuitously assume the burdens of a Central Asian policeman in order to preserve Russia's hold over Eastern Asia, then the American people must prepare to throw aside their pacific traditions and embark upon the greatest military program the world has ever seen. Make no mistake about this. Unless the Asiatic is permitted to exist in Asia, then, sooner or later, he will be forced over the seas, and the youth of America will pay the price for the sentimental idealism of present-day leaders.

Since writing the above article, many prominent American editors have arrived at the same sensible conclusion, and while it is perhaps too early to state that American opinion as a whole is in favor of such a solution, there are signs that the time is not far distant when the vast majority of Americans will be convinced of its wisdom. For some years before his death, Roosevelt was the foremost contributor to the *Metropolitan Magazine*. It took the lead as the exponent of vigorous, red-blooded Americanism. Since his death, General Leonard Wood's two-fisted patriotic articles has kept alive the manly teachings of Roosevelt. When the editor of the *Metropolitan Magazine* takes a firm stand on any vital national question, we may be sure that his views are not out of harmony with those of men like Leonard Wood and others of his type, who are once more directing American policies. Let us therefore give careful consideration to what the editor of the *Metropolitan Magazine* has to say in regard to Japan's right to exist:

"But—and it is a but of tremendous significance to Japan and indirectly to the world—the Japanese must have room in which to expand or lose their vigor as a people. Their natural outlet would seem to be in the unpopulated spaces of Asia."

"The editor of the *Metropolitan Magazine* makes a vigorous argument to this effect. He says, 'we must recognize Japan's need of expansion ; that practically she has but one opening left and that on the continent of Asia and he concludes :

"'Our policy should be to preserve the open door in these regions so far as possible, but not to interfere with Japanese expansion in Manchuria and Eastern Siberia. For unless we realize that prolific powerful races must expand into the empty spaces of the world, and unless we look at the map and see that Northeastern Asia is the only field left open to Japan, and unless we stop a policy of hindrance in that part of the world, we shall surely have to fight Japan. Our third point is that instead of a policy of interference in Asia we should ask England and Japan to forego the Anglo-Japanese Alliance and form a triple entente for the preservation of peace in Asia and the world.'"

The *Metropolitan Magazine* faithfully reflects the views set forth in the October number of THE FAR EASTERN REVIEW. As Japan cannot send her children to America or the British Dominions in the Pacific, she must send them into Asia. To preserve the peace of Asia, there should be some new instrument or understanding to take the place of the Anglo-Japanese Alliance, that will guarantee to the yellow race their right to live and expand within the limits of their traditional civilization.

We may now read what the editor of the American *Review of Reviews* has to say on the same matter :

"'Trouble between Japan and the United States is both needless and absurd. It could only come through misunderstanding begot by mutual jealousy and suspicion.' He suggests that Americans 'should study Japan's problems, and help her to solve them on sound principles.'

"What is the fundamental problem of Japan ? It arises of her growing population and her smallest fertile acreage relative to area of any civilized land. The Japanese must simply have more ground to stand on. And the editor of the *Review of Reviews* would give it to them in Russia. 'The United States better than any other power could propose that the disposition of East Siberia should be considered, so as to permit Japan to put its case before a fair commission. No European power has any right to seize all Northeastern Asia and keep it in escrow when teeming millions seek it. The yellow race needs space.'

"Concerning the Russian claim over Northeastern Asia, we are told that—'A mere occupation, as one of the incidents of war, should not be made a basis for conquest anywhere without consideration by the great powers to-day responsible for the world's

governance and new titles; but why should not Japan receive a region close to it, uninhabited, in all, Arctic and temperate, 1,000,000 square miles, which Japan can improve better and make useful to the world quicker than any other land? Japan and China have a fair right to waste and open land whose ownership Russia has used only to exclude others—in one case with extreme barbarity.' "

Accordingly, the *Review of Reviews* believes that "no better policy exists to-day than to give East Asia from the Arctic down to the China Sea to the various peoples of the yellow race and in end the line may be drawn at Torres Strait."

The editor of the *Reviews of Reviews* also faithfully reflects the views presented by THE FAR EASTERN REVIEW and endorses the appeal made in our March number for a Pacific conference in which the cards can be placed on the table by all concerned in preserving the peace of Asia.

And then read what the *San Francisco Chronicle* has to say:

"The proper outlet for the Japanese surplus population is into the unoccupied areas of Asia. There is plenty of room and no racial antagonism, but the work is pioneering.

"Nothing prevents the Japanese from going anywhere in Asia, where there is abundant room for the exercise of their industry and thrift. There is, however, objection to the apparent theory of the Japanese that wherever in Asia they wish to go the Japanese must run the country, with no non-Japanese allowed on the premises. If the Japanese will emigrate into China, Mongolia or elsewhere and become real citizens of the country, all Asia is open to them, and it is much nearer than this country."

We might lengthen this out indefinitely by extracts from other American editorials. When such prominent American editors agree in principle as to the proper solution of this problem, it may be taken for granted that the time must arrive when the rest of the country will see things in the same light. If we are to have peace in the world the question of where the surplus millions of Asia are to go to, must receive careful and immediate consideration from those who have the power to bring about a solution while there is time.

G. B. R.

THE PROBLEM OF THE RACES

By George Bronson Rea

"IT HAS BEEN ESTIMATED THAT THE EARTH CAN MAINTAIN A POPULATION OF 6,000,000,000, A TOTAL WHICH WILL BE REACHED ABOUT A.D. 2100.—*Whittaker's Almanack.*

"THE EARTH CAN SUPPORT A POPULATION OF 2,200,000,000 LIVING ACCORDING TO THE AMERICAN STANDARDS OF LIFE, OR 5,600,000,000 ACCORDING TO GERMAN STANDARDS, BUT IF ALL THE PEOPLES OF THE WORLD SHOULD LIVE ACCORDING TO THE JAPANESE STANDARDS, OLD MOTHER EARTH COULD EASILY SUPPORT A POPULATION OF 22,400,000,000. . IN 150 YEARS, AT THE PRESENT RATE OF INCREASE, THE POPULATION OF THE EARTH WILL BE TEN BILLION."—*Report of the Japanese Sociological Society (1915).*

NOTE.—The main facts and argument in this article formed the basis of a special intelligence report prepared for and at the request of the American military authorities in France in November, 1917. The vital truths herein outlined undoubtedly helped to influence the highest American military officer in France to advise President Wilson against sending an American army to Siberia. I have been requested to revise the report and bring the relation between the German and Japanese population problem up-to-date. This I have done, and present herewith the result of this study. My prophecies concerning Germany's post-bellum commercial and emigration policies are being carried out exactly as I foretold. The situation in Japan is rapidly developing along the same lines. The problem herein outlined overshadows all others. It is not only the problem of Japan, but of China. Inattention to the working of these forces resulted in the explosion of 1914. The facts surrounding the rapid increase of Far Eastern peoples warns us that we must open the blow-off, get off the safety-valve and permit the pressure to escape into channels where it will operate for the benefit of the whole world, or, continue to squat and invite the next catastrophe.—G.B.R.

WHAT nations or peoples are to control the fair places of the earth? In the struggle for existence, for the right to live, to procreate, and be happy, that our grandchildren must face, will the smaller and weaker nations be permitted a place in the sun under their own flag and institutions? This is the real problem of the world, the issue that should have been faced at Paris in the Peace Conference.

Ponder over the figures at the head of this article. Analyze them. Study them. Which is right; the estimate of the white statistician or that of his equally learned yellow brother?

It is not my intention to delve into intricate statistical details. The high points must be sufficient for the purpose of this argument. According to Mulhall, the population of the earth has doubled in the last eighty years. The population of the earth at the present time may be placed at 1,700,000,000. In eighty years (2,000) it will reach 3,400,000,000, in another eighty years (2,800) it will be 6,800,000,000.

With slight variations the average European nation (Russia excluded) is doubling its numbers in about eighty years. The figures vary. In his "Elements of Vital Statistics," Dr. Newsholme sets out at length the annual increase of a large number of countries. The period under his review, 1891 to 1895, showed a doubling of the population of Prussia in 49 years, in England in 59 years, Italy in 67 years, Austria in 74, and of France with her exceptional birthrate, in 591 years. Russian statistics indicate a doubling of the population in 50 years. This rate of increase is achieved without any undue strain on the older countries from which the stream of emigration flows to populate the new lands of the earth. With the aid of this surplus, the United States is also doubling its numbers in about 50 years.

Dealing with this same problem in western Europe, and excluding Russia and the Balkans, Mr. Longstaff in his "Studies in Statistics," reaches the conclusion that in the period under review (1861-1891) the increase was at the rate of 21 per cent., or

6.6 per cent. in each decade. If the population continued to increase at the same rate as from 1850 to 1880, it would arrive in 1990 at close on 455,000,000. This study reveals that the population of western Europe is doubling in 66 years. If Russia, with its 175,000,000 people doubling in 50 years be included in the study, the general European average would be 58 years, without taking into account the drains from emigration.

As long as there exist fair places under the sun where the European can emigrate to, the problem of the increase will remain more or less academic to their governments.

What was the situation when the great war broke out? "The Italian laborer was overrunning the globe becoming the rival of the American in New York, of the French in Provence, in Lorraine and in Paris. The Argentine is almost an Italian colony. The Germans and Swiss were colonizing Paris, the east of France, London and South America. The Pole was found on both sides of the Vosges. The Scandinavian, the Russian Jew, the Hungarian, and the peoples of southeast Europe were elbowing the native born of every country." From the vast spawning grounds of eastern and southeastern Europe millions have overflowed into the waste spaces of America. And still they come, stronger and more determined than ever, crowding into the narrow confines of city districts and undermining our institutions. The Hindoos were knocking at the doors of British Columbia and other fair places in the empire of which their land is the corner-stone. The yellow man was seeking his opportunity in the lands of the Pacific paradise, but the doors were closed to him.

The Japanese have no outlet. They are increasing at the rate of about 700,000 a year and with no place to go. The doors of the fair places of the world held by the white man are closed to them. They have been denied the right to cross the seas. The internal pressure has, therefore, forced them to study their problem and find a solution. They have made careful investigations, and, as a result, their learned professors estimate that by A.D. 2070 (150 years hence) the population of the earth will exceed TEN BILLION. This is four billion more than Whittaker's estimate. The discrepancy would indicate that the Japanese savants base their findings on data not accessible to or understood by the Western student. Why this great divergence in opinion ?

IN THE NEXT TWENTY-FIVE YEARS—WITHIN OUR LIFE TIME—JAPAN MUST FIND ROOM FOR AT LEAST TWENTY-FIVE MILLION NEW PEOPLE. IN THE SAME LENGTH OF TIME, CHINA WILL ADD ANOTHER TWO HUNDRED MILLION TO HER POPULATION. RUSSIA WILL REQUIRE ROOM FOR 87,000,000 MORE.

WHERE WILL JAPAN FIND ROOM FOR HER SURPLUS ?

WHERE WILL THE CHINESE EXPAND ?

The great difficulty facing Western investigators in arriving at a reliable estimate of the increase of the human family, has been the notorious lack of statistics concerning the Mongolian and Asiatic races. The peoples of Asia comprise one-half of the world's population. They belong to a different civilization, holding diametrically opposite views to the West on the question of marriage and the birthrate. Therefore we cannot apply the same rules in estimating their increase as we do in Europe or America. It is only by understanding Oriental conditions that we may grasp what lies behind the prophetic estimate of the Japanese experts.

Restricted by our laws, religions, customs, respect for women and the necessity of taking care of and educating our children, the peoples of the West require an average of eighty years to double their numbers. In France, the population is dying out. This tendency is also seen in the birthrate of the upper classes of England and the United States.

In Asia we find different conditions. The standards upon which our Western civilization are based, crumble away and disappear as we cross over into the older continent. We find lands where polygamy, concubinage and female slavery prevail. Woman descends from her high pedestal of the West and becomes the plaything of the male ; the breeder of children. In China we find yet another civilization based upon ancestor worship, obligating perpetuation of the male line to perform the sacrifices at the shrines of departed ancestors. What effect has this on the birthrate and increase ? Here is where the Western investigator is baffled through the absence of statistics. Japanese statistics of the native Chinese population in Formosa show that the latter are doubling their numbers in 33 years ; in the Kwangtung Leased Territory, in 31 years. The full effect of Oriental civilization on the rate of increase is seen in Korea, where statistics of the native population indicates a doubling of the numbers in 27 years—six times as rapidly as the white man.

There are no reliable statistics covering China. We can only hazard a comparison with the Japanese statistics quoted above. A study based on available Chinese data is most unsatisfactory. For instance, in 1851, the population was put at 432 millions. In 1861, it was stated to have fallen to 261 millions, due, in part, to the terrible massacres of the Taiping rebellion, which in ten years destroyed over 90 millions. Although estimates vary, yet it can be accepted that the present population is rather over than under 400,000,000. It is estimated that 4,000,000 people die annually in China from starvation and purely preventable causes, such as floods, famine, cholera, plague, etc., without including deaths from internal disorders, rebellions and bandit forays. One per cent., or almost the average increase of Western peoples, is annually destroyed in China. Yet the Chinese increase. With the construction of railways, conservation of rivers, installation of modern sanitary and water systems, hygiene, a stable government and other reforms, the greater part of this waste will be eliminated and then the full effect of the Chinese birthrate will be felt. It is fair to assume that this increase is about the same as it is in Formosa and Kwangtung. It is also believable that in some sections of China the increase reaches the same alarming figure as in Korea. It is therefore permissable to take forty years as the time required for doubling the numbers of China, but for the purposes of this study it can be placed at fifty, or, about the same as Japan, Russia, the United States, etc.

There are 400 million Chinese and 70 million Japanese. With their co-religionists in Indo-China, Siam, Java and elsewhere (outside of India), holding the same viewpoint, the total will be about 500,000,000. We can leave the 350 million Hindoos out of the question for the moment. If the white or non-Asiatic population of the world, numbering 800,000,000, are doubling their numbers in 80 years, there will be approximately 3,200,000,000 in 160 years. If the 500,000,000 yellow men are doubling their numbers in 50 years, they will number 4,000,000,000 in, 150 years, or if we take the doubling of the population at 40 years, they will number 8,000,000,000 in 160 years.

There are 350,000,000 Hindoos in the Asiatic family, adhering to more or less the same viewpoint on marriage and the birthrate as the Chinese and other Buddhistic peoples. The death rate is, however, nearly equal to the births. Plague, cholera, famine, floods, and other decimating visitations of sickness keep down the increase. But with modern improvements, sanitation, etc., the rate of increase will steadily climb up in the next quarter century. The Hindoos will then demand their place in the sun, under the flag of the British empire. All the might of Great Britain cannot forever keep these people within a ringed enclosure. *Africa will become the America of the Hindoo.* It is well to bear this fact in mind.

We can now begin to understand that the estimate of the Japanese Sociological Society, is based upon the difference in the time required for the white and the yellow man to double his numbers.

In an endeavor to throw light on this Asiatic problem and invite discussion, I wrote a series of articles in 1915 which appeared in many American papers under the title of "Japan's Place in the Sun." I purposely refrained from further discussion of these problems at a time when Japan was our ally, honorably contributing her might towards the defeat of the common enemy. Conditions have changed since 1915. Germany is defeated. A League of Nations has been formed to settle the problems of the world. Japan has become one of the five great powers and is asking for her reward. On the surface, her claims have been confined to minor territorial matters, the Pacific isles and Kiaochau, but underneath, there remains the same tremendous problem, the cry for racial equality, for the right of her people to travel and reside in other countries of the earth on a plane of full equality with the scourings of Europe and the black man from Africa.

Japan is saying to her four great allies, "What places of the world are to be opened to my people? We prefer not to go into China or other parts of Asia; we cannot compete with our Asiatic brethern on the mainland. Will you concede my people a place in the sun; will you permit us to take our place on a plane of equality with the rest of humanity by whose side we have fought; will you accept us as equals in peace as you did in war; or, because our skins are yellow, because our civilization is different; will you compel us to absorb our increase of population within the narrow and congested confines of our island empire?" This is the problem of Japan: the voice of Asia echoeing across the seas to the conference table at Geneva. On its honorable solution depends whether our sons or grand-sons are to wage another and more terrible struggle for the right to exist. And, mark it well. Four hundred million Chinese and three hundred and fifty million Hindoos are silently watching the ways of Western justice. They are waiting to hear what the answer of the nations will be to Japan, their spokesman.

In order to drive home what the future holds in the Pacific, it is necessary to invite attention to the operation of forces in Europe, which, in part, were responsible for the late conflict. It is, therefore, essential to scrutinize the facts as applied to Germany.

The picture revealed by the figures is clear. We see before us a comparatively small and congested empire whose population was increasing at the rate of 800,000 per year. It may be true that the increase was beginning to fall off, but the percentage was so small that it should not be permitted to cloud the essential truth. In connection with Austria, the Teutonic increase was over a million a year.

Germany had no colonies in temperate climes where her emigrants might remain under their own flag, preserve their national characteristics, habits of thought, Kulture with a big K, if you will, and retain their allegiance to the "Fatherland." Austria had no colonies. She gobbled up her smaller and weaker neighbors. It is true that Germany possessed colonies, which, under certain conditions, might be peopled, developed and exploited, but they could hardly be classed as fit homes for any self-respecting white man. The non-colonial policy of Bismarck deprived Germany of her opportunity to acquire suitable outlets for her surplus population, and, after his death when the craze for expansion became the keynote of the imperial program, all the fair places of the world had been pre-empted by other more far-sighted powers.

In the meanwhile, the Germanic peoples continued to increase. In the main, they remained at home. They developed a great material civilization, and, in a few decades became a highly centralized, industrial and commercial nation. As their industries increased by leaps and bounds, foreign markets, a merchant marine and navy for its protection, became necessary. Had an outlet been provided, the explosion might have been averted, at least, delayed.

Deprived of an outlet in temperate climes under their own flag, the internal pressure in Germany followed the natural law governing the operation of such phenomena. The powers calmly squat on the safety-valve of the German steam boiler, congratulating themselves that they had the pressure under control. Something had to burst. It did.

Some writers deny the force of this statement, by proving to their satisfaction, that Germany was not over populated; that the birth-rate was steadily decreasing; that over 700,000 foreigners were imported annually to plant and harvest the crops and work the mines. This statement is true, but it cannot wipe out the fact that there was an annual increase of 800,000. Where did they go to?

The neighboring countries of Europe became German colonies. Instead of exporting labor, her commercial element was distributed throughout the world. France became a preferred German colony. There were more Germans in France at the outbreak of the war, than there were Frenchmen in the French colonies. Why? Look at the statistics and read aright the story of the figures. We see in France a nation whose population has remained stationary for almost a century. Yet this did not deter France from embarking upon an ambitious colonial policy. France had no pressing population problem to solve. Every Frenchman who emigrated to the colonies left a void in the commercial and industrial life of the mother country. Their places were filled by Germans, by Poles and Italians.

It is impossible to provide against such a contingency. The rich, prosperous, highly cultured state whose birthrate falls off to such an alarming extent as did that of France, becomes the outlet for a neighboring people whose procreative recklessness is indicated, as in the case of the Teutonic nations, by an annual increase of nearly a million people.

Russia became a German commercial colony. German merchants and drummers were everywhere. Their political agents were found in all branches of the government service. Russia was, and still is, inoculated with the virus of German culture. German influence was felt in the highest court circles. It is now the moving spirit behind Bolshevism. To carry on such a scientific propaganda, required a high order of intelligence. The German laborer could never have succeeded. The story of Russia since the outbreak of the war furnishes conclusive evidence of how a neighboring state can ultimately be brought under the influence of a stronger, more astute or unscrupulous power, through the machinery of peaceful penetration, bribery in high places and the skilful use of propaganda amongst the masses. Russia blocked Germany's expansion to the East. The picture of present-day Russia is the result.

The story was true even in England. Germans were so firmly entrenched in the financial and commercial life of the empire, that it was difficult in many cases to ascertain where real British interests began and ended. The failure of the British government to exercise a controlling influence over foreign loans made it possible for Germany to utilize British credit and money for her commercial penetration into British markets, while employing her own resources to create a huge war machine.

IF WE BAR THE WAY TO THE EXPANSION OF A PROLIFIC PEOPLE THROUGH THE ACQUISITION OF COLONIES, WE MUST ADMIT THE OVERFLOW INTO OUR OWN NATIONAL AND ECONOMIC LIFE, THUS LOWERING OUR STANDARDS OF WAGES AND LIVING.

OR, IF WE ERECT BARRIERS AGAINST THEIR ENTRANCE, AND COMPEL THEM TO ABSORB THEIR OWN SURPLUS, WE INVITE ECONOMIC DISASTER THROUGH COMPETITION IN THE MARKETS OF THE WORLD WITH THEIR LOWER-PRICED PRODUCTS.

THE PRICE HAS TO BE PAID.

The United States had its own problems arising from the colonization of certain sections of the country exclusively by Germans. Argentine, Brazil and Chili were filled with German mercantile houses. Their influence in China was sufficient to delay for three years China's entrance into the war. They dominated Spain and the Scandinavian countries. In other words, the absence of colonies in tolerable climates, compelled the Germans to quietly diffuse themselves throughout the other countries of the world.

The indictment is brought against the Germans that they violated the hospitality of nations whose doors were opened to them. The indictment is just. Human nature being much the same the world over, can we honestly expect the German, any more than the American, the Briton, the Japanese or Chinese, to change his ideals, his allegiance and love for his country, when he changes his residence ? Swayed by the passions engendered by the war, have we not asked something from the Germans that we would not tolerate ourselves ? The Germans had no monopoly of the gentle art of peaceful penetration into the affairs of weaker nations ; of creating interests to serve as the basis for future political dominion, or provoking incidents to justify armed intervention.

It is easy to ask that the German who makes his home in America, abide by its laws and conform to its ideals. It is also easy for the honest German to assimilate our mode of life and thought, and in time, become a good American. He is a long distance from the Fatherland and its influences. We cannot expect that the German who overflows into the neighboring states of continental Europe, at all times in touch with his Fatherland (only a few hours distant by train), can, or ever will, renounce his allegiance or forsake his ideals and conception of Germany's mission in the world.

As we look back over the events of the past two decades, we can see how this forced German colonization of France, Russia, Great Britain, Brazil, and other countries gave rise to suspicion, misgivings, unrest and finally hatred. As German trade and influence grew apace, invading the special fields of British and French manufacturers, underselling the products of all other countries, we saw the logical result in the intensification of national commercial rivalries, jealousies and animosities. Germany was capturing their trade even in their own colonial possessions and established markets. The other nations complained.

If we study the problem dispassionately, the question must arise, where else could the Germans find their outlet and opportunity ? If France, Great Britain, Russia, and other countries were, to a large extent, preferred German colonies is it not traceable to the fact that these same powers were, in part, responsible for her failure to acquire suitable colonies of her own ? One cannot have his cake and eat it too. The policy of the other powers compelled the Germans to diffuse their energies in the very states which opposed their expansion.

If the pre-war rate of increase in the population of Germany is maintained, may not the same peaceful penetration into other countries be resumed ? Will not German interests again attempt to influence the politics of other countries for the furtherance of their own ends ? In the development of postbellum commerce, will not German capital seek to escape the penalties imposed by the war indemnities, through investments in neutral countries where there is no crushing tax on profits ? Will not Spain, and the South American countries become favored German commercial colonies ? *Will not the Germans in some way or other seep back into the preserves of the allies ? If Germany is prohibited from possessing colonies or room for expansion, will not the old process be followed out once more to its logical conclusion ? Will not this policy again direct the flow of Germany's surplus population into allied territories, or into neutral countries where the creation of German industries must ultimately react upon the trade of the allies ? Will we not have to pay the penalty in the long run ?

*Krupps have recently acquired huge iron properties in Chili, at a cost of $10,000,000, on which to base the erection of steel works, designed to capture the South American markets.

The statement that the Germans had ceased to emigrate and were importing foreign labor for their fields and mines is emphasized by some writers as proof that Germany was not over-populated, and, therefore, had no need for colonies. But when the emigration statistics are cited in support of this statement, is it not reasonable to assume that the figures are confined to emigration by sea ? It would be difficult and impracticable to keep an exact record of the thousands overflowing into the commercial life of neighboring nations using the network of continental railways as channels of travel.

If the Germans did not emigrate, what then became of the 800,000 annual increase ? Obviously, they were absorbed by the creation and expansion of industries. This carried its corollary of new markets to dispose of the products. The industrial life of the nation became intensified. Now if we erect a ringed fence around a rapidly-increasing industrial people and compel them to absorb their own surplus population, we must expect their products to compete with ours in the markets of the world. In such a competition the advantage will go to the economically superior, to the people who face the greatest struggle for existence ; to those who can live the cheapest and work for the lowest wages.

Analysis would seem to indicate there is no escape from the certain penalty of circumscribing the national expansion of a virile, industrial people. If we bar the way to their acquisition of colonies in tolerable climes, we must pay the price by admitting the surplus population into our own national and economic life, thus lowering our standards of wages and living. Or, on the other hand, if we erect barriers against their free entrance into neighboring countries and compel them to absorb their own surplus, we invite economic disaster through competition in the markets of the world with their lower priced products. The result seems to be the same. The highly centralized, over-populated industrial nation facing such a problem will have to be permitted to live. They will make a desperate struggle for existence.

Germany was the only great nation faced with the problem of a rapidly increasing population having no suitable outlet under their own flag. When the Briton feels crowded or the struggle for existence becomes too keen, he simply visits one of the many colonial bureaus and selects a new home in Canada, Australia, New Zealand or South Africa. He is assisted to reach there. He remains under the Union Jack and preserves his national characteristics. There is no pressing problem arising from a surplus population in the British Isles. The expansion of industries competes with the colonies for the supply of labor. The opportunities of the Briton are boundless.

France has no surplus population. Her problem is the other extreme ; how to increase the birthrate and people her vast colonial empire and defend her home territory. When seeking for the causes underlying the great war, we cannot overlook the trait in the French people which permitted their population to remain stationary, when a next door enemy was doubling her numbers in sixty years. It opens a line of thought that should receive careful consideration in any equitable adjustment of world problems. It was the impelling argument used by Clemenceau to induce Wilson and Lloyd George to enter into a separate alliance for the defense of France. If a nation refrains from increasing, and the people of a neighboring state holds opposite views, and doubles their numbers in fifty years, has the former the right to retain control over vast expanses of the world's waste surface ? If France with no surplus population, is to possess vast domains in Africa and other parts of the world, and the Germanic states with an annual increase of 800,000 are prohibited from enjoying an outlet under their own flag, will not the time arrive when the issue will be fought out anew ?

With the doors of allied countries closed to them, the Germans must go somewhere. If they take a notion to concentrate on some Latin American state, Mexico, or Chili, must not the day arrive in the future when they will again create trouble ? Suppose they select Spain and the Spanish zone in Morocco as a field for future colonization and commercial exploitation, and use this neutral

territory as a base from which to stir up trouble amongst the Moors, can France or the allies intervene in the affairs of Spain and demand their expulsion ?

Russia has no surplus population problem. She has land enough for her increasing millions for another century. Emigration from Russia is caused by a desire to escape from intolerable political conditions. In another half century, the population of Russia will number 350,000,000. Her land hunger under the old régime was insatiable. Slowly, but surely, the domains of Central Asia, were gobbled up. She was reaching out for Afghanistan with the ultimate idea of absorbing India. This advance on India was the reason for the Anglo-Japanese alliance. Chinese Turkestan, Mongolia, Manchuria, the Amursk, northern Persia and other corners of Asia were absorbed. She was stretching out her hand for Korea with the idea of subjugating Japan, when she met her first check. She was intrigueing in Tibet to obtain a free road to India in this direction. The "Drang nach Osten" of the Teutons was a child's game compared with the "Way of the Bear." Had not the great war started in 1914, it is probable that Japan would have had to fight Russia once more for her independence. The only excuse for Russia's persistent land-grabbing policy was to drive her frontiers deep into Asia to prevent the pressure of the yellow races against the white man's frontier of the Urals. This, however, did not, and cannot, stop the increase of the Mongolian race. At its best, it could only retard for a few years the struggle for the right of the latter to live in the spheres where nature has placed them.

The United States has not had to face the problem of providing for a surplus population. There is still room enough for another century at the present rate of increase. But the great opportunities have gone. Italy, Spain and other countries are populating South America with their surplus. Germany and Japan are the only two powerful nations whose population increase causes their rulers to lay awake nights dreaming of outlets.

I might amplify this discussion to cover other phases of the situation in Germany arising from this rapid increase of population, but these matters have been clearly explained by many competent authorities within the past four years. My only desire is to emphasize the high points without carrying the argument to a stage where it might be construed as an attempt to justify Germany in precipitating the war.

It seems clear that there must have been some overpowering, compelling motive driving the Germans onward in the war. There was. They were told "they were battling for self-preservation, for the right to live, for the future of their children." An appeal was made to the first law of nature. "The door of equal opportunity was to be closed to them. The fair places of the world for others. Germany could have no colonies." The result is before us. If the first duty of a government is to provide for the present and future happiness and welfare of its people ; will not a liberal or republican Germany, in the face of an ever-pressing population problem follow the same policy as the former autocratic régime ? If we deprive them of arms or means of waging warfare, will not the struggle follow the lines of peaceful penetration, or colonization in weaker neutral states ? There is no form of government, no laws, regulations, peace terms or solemn covenants, that can withstand the steadily increasing pressure of a rapidly expanding population.

The German people will continue to breed. They are now advocating polygamy, lateral marriages and placing a premium on child birth. Where will they go to ? How will they live ? As we try to answer this question, are we not following a vicious circle and return once more to pre-war conditions ? If we erect a ringed fence around Germany, and the powers, now augmented by the United States, gleefully squat once more on the safety valve, and delude themselves that the danger is past, will not the same old story be repeated ? Will not the neighboring countries of Europe again become German colonies ? Are we foolish enough to believe that the erection of a Chinese wall around Germany will prevent the reciprocal exchange of products or labor ? The laborer will seep through and find a place to sell the products of his toil. The colonization of France, Britain and Russia will begin again where it left off. If the Germans continue to increase as in the past, and the French people diminish in numbers, will not the time arrive in another generation, when, figuratively speaking, the Germans will water their horses in the Atlantic Ocean ?

No ! thunders the French. Never ! echoes the Briton. The Germans must and will be excluded. They must remain at home or overflow into some other country. They will be condemned to practice racial suicide or absorb their surplus within their own boundaries. Very well, let us accept this verdict. The struggle for existence will become intensified. If the Germanic peoples are to live and pay the great war indemnity, they must produce and sell their products abroad. As the struggle becomes keener and the pressure greater, German manufactured articles will undersell those of all other countries in the *neutral* markets of the world. Or, the Germans will migrate to some other country away from the influence of the allies. This Land of Promise is to be Russia and Siberia. In the Altai mountains Germany expects to obtain possession of the mineral wealth which in time will permit her and Russia to dominate the world. So, no matter which way we look at the problem, the result seems to be the same. If they are to stay at home, they must be permitted the opportunity to manufacture products that will enable them to purchase the food to support their yearly increase. The keen struggle for existence will gain for them the control of foreign markets, unless penalized by superior force. In view of such a possibility, it is only human nature that they will do everything to circumvent these penalties by emigrating into regions where the allies may not interfere with their commercial or racial development. In this case, if they carry out their program to overflow into Russia and Siberia, some day they will gather enough strength to again test the endurance of the allies. In other words, we cannot stop the operation of nature's laws, and, if the Germans continue to multiply as in the past, the rest of the world must face their competition in trade, and when the time is again ripe, their hostility in arms. The penalty must be paid.

Squatting on Japan's Safety-Valve

Every argument that applied to Germany and Europe applies with ten times greater force to Japan and Asia. Japan is facing the same problem but with this immense difference. Whereas, the doors of all countries were wide open for the entrance of Germans, the portals of the great white nations of the Pacific are closed to the sons of Nippon. No Japanese need apply. As Germany's surplus had no suitable lands under their own flag to emigrate to and develop, she sent forth her merchants, her bankers, her drummers and educators, who labored day and night to create the vast markets that made possible the existence of those who remained in the Fatherland. With the doors of the great white nations of the Pacific barred against the entrance of her laborers and artisans ; confronted with the impracticability of their emigrating to the mainland and competing with their Asiatic brethren, the Japanese laborer must remain at home. In order to exist, Japan must follow the example of Germany and send forth her merchants, and privileged classes to the uttermost ends of the earth to find markets for products that will enable her masses to eke out a miserable hand-to-mouth existence within their walled-up island empire. For this is exactly what Japanese exclusion in America and the British Dominions must lead to, unless an outlet is opened for their activities in Asia. The industries of Japan will never stand the strain of absorbing 700,000 new laborers a year for any length of time, and the rest of the world is foolish to believe that it can be done without precipitating a struggle for existence which will again culminate in an explosion. True, Japan like France can practice some method of birth control and so lessen

the internal pressure. But with a neighbor whose procreative recklessness is maintained in check only by severe natural antidotes, it is futile to expect that the Japanese will submit to any restriction on their increase, while China pursues an opposite course. If the doors of other countries are closed to them and there are vast waste spaces in Eastern Asia awaiting settlement, we must expect that a virile people will fight for their right to occupy them before mutely accepting the alternative of race suicide.

Will the world refuse to heed the lesson of the last Great Sacrifice ? Will the United States repeat the errors of European diplomacy and adopt a policy in the Pacific that will tend to exert the same pressure upon Japan as Europe brought to bear upon Germany ? If the American people are determined that this policy be pursued, then Japan will have no option left than to follow in the footsteps of Germany and send her young men out into the world to capture its trade in order that the masses at home may live. Is Japan, like Germany, to be compelled to absorb her 700,000 new children a year into the ranks of her industrial army for the expansion of her factories, her mills and her looms ? If so, we must face the consequences and meet their competition. For Japan must live. She must sell in order to purchase food. Like England, her very existence will depend upon foreign trade. She will create a vast mercantile marine and construct a formidable navy to ensure that her food lines will always be maintained open. She will become the Germany of the East, reaching out to all the markets of the earth to dispose of her products. She will develop into the England of Asia, a nation whose very life depends upon the maintenance of a powerful fleet. In the struggle for existence, Japanese products, like those of Germany, will find their place in the markets of the world, and the keen competition will engender trade rivalries, hatred, and ultimately strife.

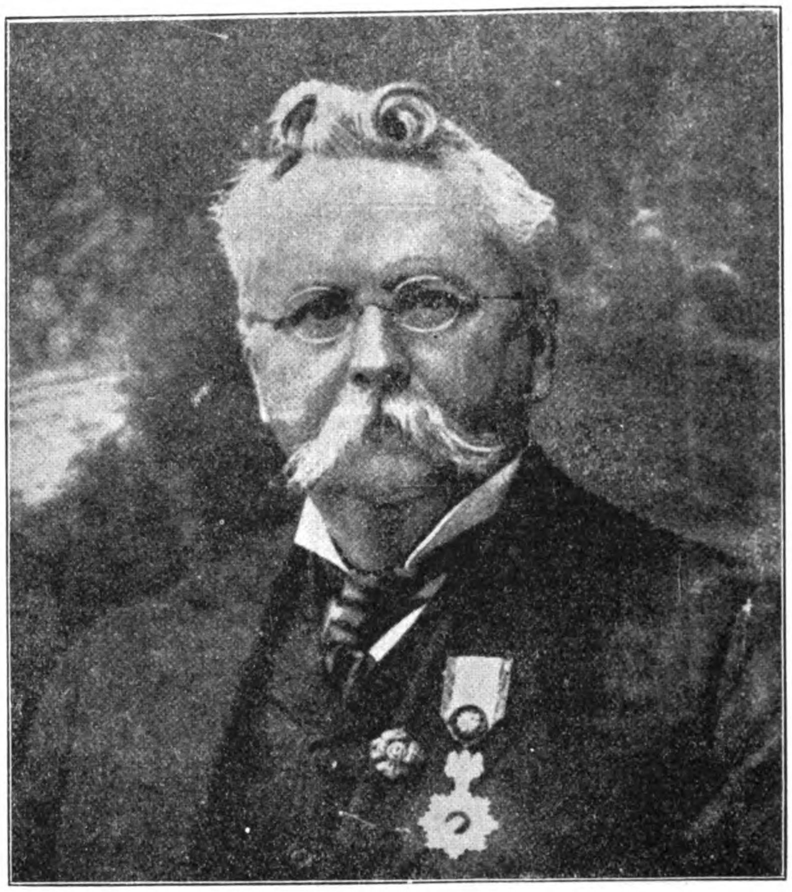
If, in addition to closing our own doors to the mounting millions of Japan, we are to follow her into Asia and obstruct her economical and commercial expansion in regions still open to her in Siberia, in Manchuria and Mongolia, and permit her to be barred from the Philippines, are we not deliberately placing ourselves in the position, where, sooner or later, we may be compelled to fight Japan ? If, in addition to carrying the burden of the Monroe Doctrine, we are to become the Guardian of China, the Protector of Russia and the Policeman of Central Asia, can we wonder that the Japanese masses look upon us with ill-will.

It is well for Americans to ponder over these truths, and give more thought and study to the problems of population than to sentimental ideals. We make no claim to infallibility. Perhaps our deductions are wrong, but they invite research and discussion. Read the works of J. O. P. Bland, and what he has to say about the reckless procreative powers of the Chinese, the root of all their woes. Lay aside sentiment and ideals long enough to probe into this phase of the Pacific problem. Then let us ask ourselves, are we to become the Don Quijote of the Twentieth century, or play the role of the "nigger who squat on the safety-valve of the "Prairie Belle." The fundamental laws of nature cannot be set aside by sentiment, ideals or loose talk about the germs of Democracy, or other popular catch-words which appeal so strongly to the American people. Monkeying with the blow-off of a high pressure steam generator can result only in a repetition of the disaster which befell Europe in 1914.

The Yellow River Bridge

IN the building of the Yellow River Bridge, tenders for which have already been invited, the ministry of communications does not seem to have left any stone unturned in its effort to bring about the best possible result. A commission of four advisers, bridge experts selected from America, Belgium, Britain and France, has been appointed to examine all designs to be submitted.

Some time ago the ministry invited Dr. J. A. L. Waddell to become the American member of the commission and Dr. Waddell has accepted. The invitation and acceptance were made through the Chinese minister at Washington. Dr. Waddell will therefore appear as the American representative on the board of advisory engineers to determine upon the award of contract in the Yellow River Bridge competition and has recently arrived in Peking.



Dr. J. A. L. Waddell,
Member of the Bridge Commission

Dr. Waddell is the author of several books his latest being "Bridge Engineering" in two volumes dedicated to the Emperor of Japan as a mark of the author's appreciation of the decoration "Knight Commander of the Order of the Rising Sun" conferred upon him by the Emperor.

A brief summary of the main features of Dr. Waddell's life follows :—

WADDELL, JOHN ALEXANDER LOW, C.E., B.A. SC., MA. E., D. SC., LL.D., D.E., Kogakuhakushi—Kansas City, Missouri. Born Port Hope, Ont., Jan. 15, 1854. Educated, Trinity College School, Port Hope ; Rensselaer Polytechnic Institute, Troy, N. Y. (C.E., 1875) ; McGill University (B.A. Sc., 1882 ; Ma. E., 1882 ; D. Sc., 1904) ; hon. LL.D., Missouri State University, 1904 ; hon. D.E., University of Nebraska, 1911 ; hon. D.E., Imp. Unv. of Japan, 1915. Draftsman Marine Department, Ottawa, 1875; Engineer, Field Work, C. P. R., 1876-1877; Assistant Professor of Rational and Technical Mechanics, Rensselaer Polytechnic Institute, 1878-1880 ; Chief Engineer, Raymond & Campbell bridge builders, Council Bluffs, 1881-1882 ; Professor of Civil Engineering, Imperial University of Japan 1882-1886 ; practiced alone, Kansas City, 1887-1889 ; Partner of Waddell & Hedrick, 1899-1906 ; Partner of Waddell & Harrington, 1906-1915 ; Partner of Waddell & Son since 1915.

Kelantan and Its Natural Resources

By V. F. STANLEY LOW, M.Inst.M.M.

KELANTAN AND ITS PEOPLE.—The two least known or explored of the protected states of the Malay Peninsula are Kelantan and Trengganu. The states of the Malay Peninsula are so frequently spoken of as the "Federated Malay States" that perhaps it would be as well to state that only four of them are federated. British Malaya is divided into the British colony of the Straits Settlements (Singapore, Penang, Wellesley, the Dind-dings and Malacca), the Federated Malay States (Perak, Pahang, Selangor and Negri Sembilan), and five other protected native states (Kelantan, Trengganu, Kedah, Perlis and Johore) all of which acknowledge Great Britain as suzerain. In each of the five last-mentioned states Great Britain is represented by an "adviser" appointed from the civil service of the Federated Malay States; and the native rulers of the various states are expected to follow the advice given by their respective "advisers." The governor of the Straits Settlements is also high commissioner for each of the native states, being represented in the Federated Malay States by a chief secretary, who resides at the capital, Kuala Lumpur.

There appears to be uncertainty as to the origin of the people generally classed under the title "Malays" who form the bulk of the population. By many these are thought to have come from Sumatra; but, no doubt, many people also came from Siam, Java and the neighboring islands. The so-called Malay is able to cultivate his land and grow rice, maize, fruit and vegatables; he is a skilled boatbuilder and boatman; he can weave silk and cotton; but he seldom produces an output of any of these articles beyond the immediate wants of himself and his family: and so great has been the kindness of Providence in furnishing rich soil, favorable climate, abundant fruits, and fish-teeming rivers that the life of the ulu, or up-country, Malay is one of comparative calm, ease and almost luxury. The Malay who has not come into much contact with members of other nations is by nature courteously polite, but shy; and nearly every Malay is a born liar, who finds no shame when his lies are exposed.

Kelantan Woman Wearing the "Selumbong"

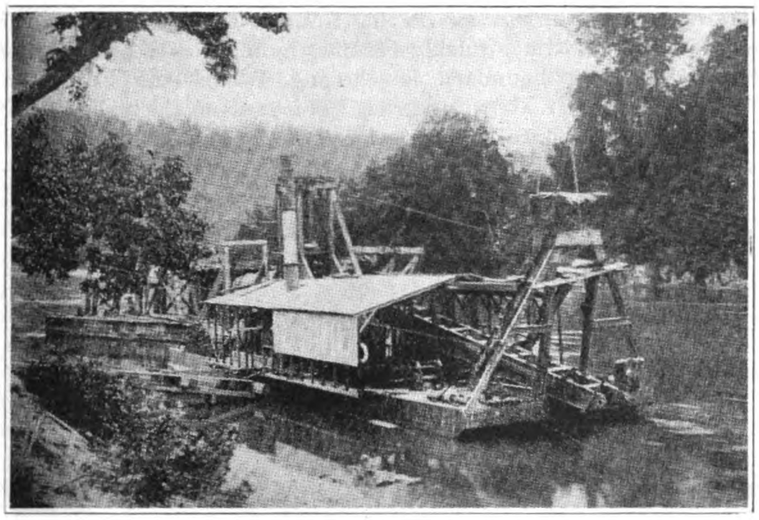
The Ruler of Kelantan: His Highness the Raja Snik bin Almorham Sultan Ahmat

Woman of Kelantan

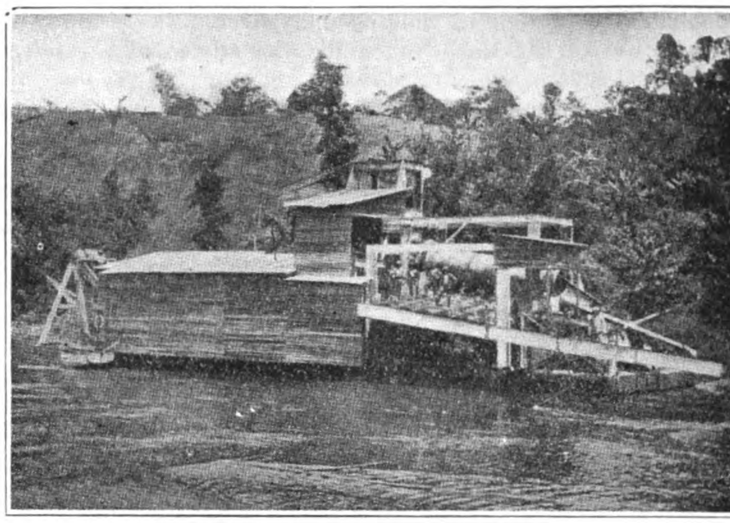
Kelantan Peasants

As a worker on the river, poling or paddling his native craft, the Malay is an untiring expert, and he is also good at jungle clearing; but he soon tires of regular employment unless it has something to do with engines or machinery. He is, therefore, of but little use for work on mine or plantation unless in charge of a launch or motor-car, of which he soon becomes a careful driver; and in these departments he frequently leaves his Chinese competitor far behind.

Only a few of the true aboriginals—the Saki—still remain. The Saki, as found in the eastern states, is, generally speaking, very shy and holds no converse with members of other races, be they white, black or yellow. He does no cultivation, but leads a



Gold Dredgers on the Kelantan River



Gold Dredgers on the Kelantan River

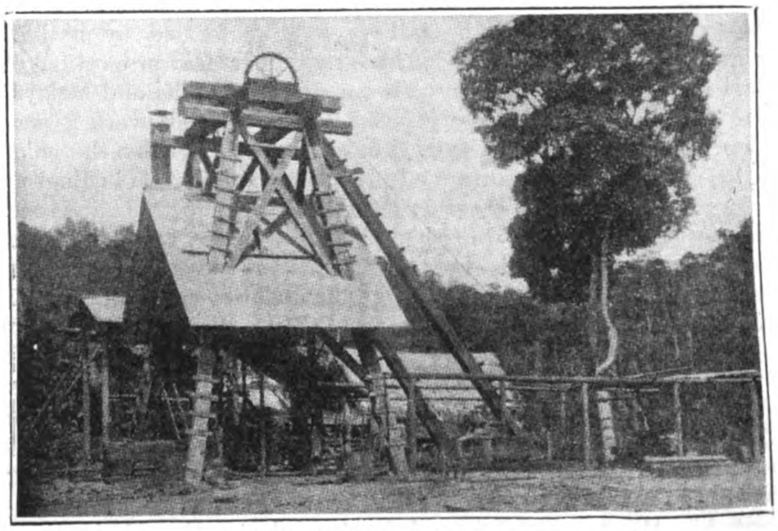
nomadic life, gaining his sustenance from roots, fish and birds, the last of which he brings down with darts discharged from a blowpipe some seven feet in length. Being a nomad he builds only temporary shelters, composed of palm fronds placed in the ground in a circle with tips inclined toward the centre so as to form a low shelter, in appearance like an upturned bowl. Sometimes the palm fronds are placed in a straight line so as to form a simple break-wind, the inclined and overhanging tips being sufficient to ward off the drips from the jungle of the heavy tropical dews. The Saki inhabiting the banks of the Nenggiri river are said to have become more settled. I have not come into contact with the Nenggiri Saki; but such Malays as I have met who have been far up that river have spoken of the Saki there as being well-developed men, skilful boatmen and good workers.

History and Governmext.—British Malaya is a land without history or historical remains. Europeans have lived on the coast for at least four hundred years; but until 1860 there was only one white man known to be resident inland. Such development as had taken place prior to recent years was due to Chinese adventurers, and, in a less degree, to the Siamese; the Portuguese and Dutch appear to have allowed the country to live dormant. The time of entry of the Chinese is unknown; but the turn of the tide came when the British took definite action in 1873. Almost the first matter in the native states to receive attention was that of state finances. By abolishing many of the taxes on exports and by taxing the importation of opium, spirits and such like; by charging rents for mining and agricultural lands, and by seeing that the money so obtained was properly expended, the financial chaos which previously existed was straightened out to such good effect that, as an example, the Federated Malay States are now become wealthy enough to make state loans to their neighbors, and at the end of 1918 had a surplus of over twelve million pounds sterling.

Map of Malay Peninsula
Showing the Various States and Political Divisions

When, in 1903, the first British adviser was appointed to Kelantan, which then belonged to Siam, he found everything political in a rotten condition. The ruling Rajah, through the plotting of his own family (the usual practice in Malaya) had lost practically all power of governing; such taxes as it was possible to gather were not used for the benefit of the state; and no accounts of expenditure were kept. Under an agreement with Siam, Kelantan in 1909 became an independent state under the protection of Great Britain. Since then the ruling native potentate has been raised

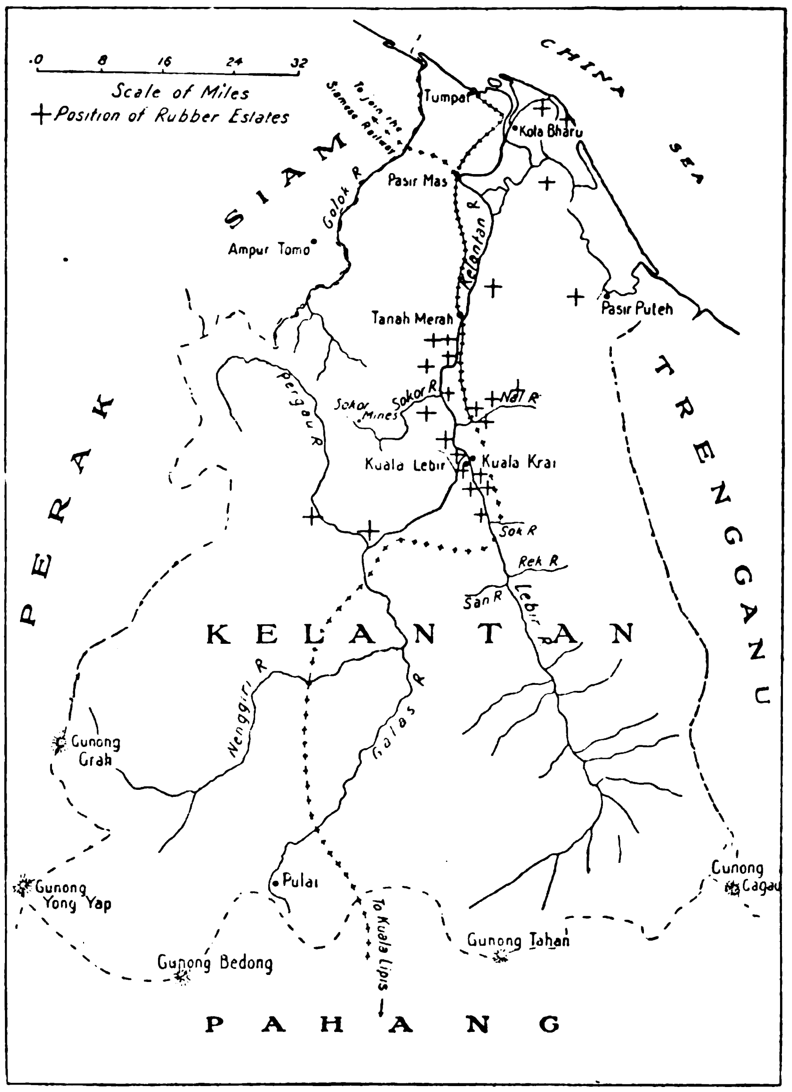
A Mining Camp, Kelantan



A Gold Mining Shaft, Kelantan

in dignity from Rajah to Sultan and governs the state with the assistance of a Council and under the advice of a resident British adviser.

Kota Bharu, the capital and seat of government, has two courts, the principal one being under the presidency of a British magistrate and the minor one under that of one of the Malay aristo-



Map of the State of Kelantan

cracy. District officers, appointed from the British side of the civil service of the Federated Malay States, attend to the magistracy of the country districts and reside at Pasir Puteh and Kuala Krai. The officers in charge of the lands office and of the survey department are British, as are also the chief police officer and his chief inspector. Most of the clerical work is performed by natives from India China, and Ceylon, assisted by a fair proportion of local Malays. The police force is composed of Sikhs and Malays. The Sikhs are purely military police ; all civil police work is performed by Malays under Malay inspectors appointed by the chief police officer. All inspectors must pass an examination in English before appointment. There are three British doctors, and one Chinese doctor holding British diplomas, who are assisted in the various native hospitals by trained dressers drawn from India and China. There is no hospital accommodation for white people except at the private hospital of the Duff Development Company at Kuala Lebir.

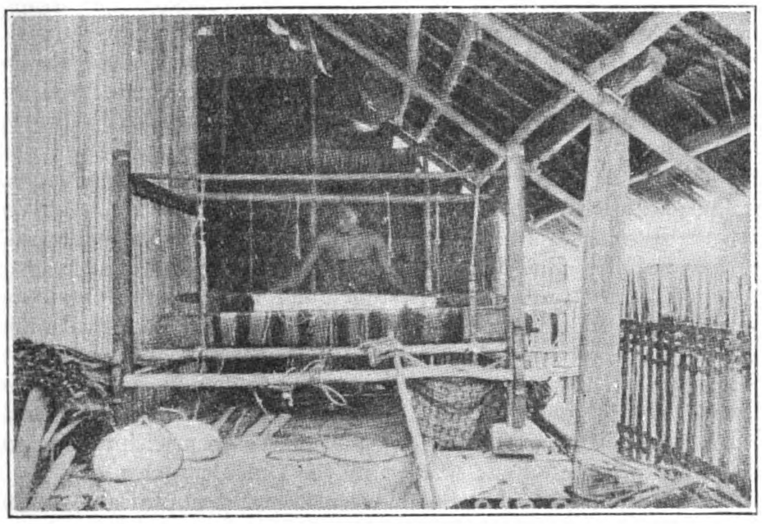
COMMUNICATIONS.—Kelantan has a coast line of 45 miles and an area of 5,870 square miles ; its greatest width is perhaps 75 miles. The country is flat along the coastal district ; and it is said that three distinct old sea beaches may be traced, showing the rapid encroachment of the land on the sea due to the silt deposited by the torrential flow of the rivers during the rainy season. At a distance from the sea varying from 10 to 20 miles the land begins to rise and then quickly becomes mountainous, culminating on the southern boundary in Gunong Tahan—the Forbidden Mountain—7,186-ft. above sea level. This is about the highest peak in Malaya. The state is well watered throughout its length and breadth by rivers. The main river, the Kelantan, runs approximately north and is formed some 62 miles inland by the junction of the Galas and Lebir rivers. The main tributaries of the Kelantan are the Sokor and Nal rivers ; but these two are not nearly so important as the tributaries of the Galas—the Pergau and the Nenggiri—which enter that river some 80 and 92 miles respectively from the coast. The Lebir has tributaries of fair size in the San, the Sok and the Rek.

The approach from the sea to Tumpat, the port of Kelantan, is bad, owing to the rapid encroachment of the land. A few years ago the custom house was situated on a coconut-grown island opposite the town of Tumpat and not far from the mouth of the Kelantan river. In those days coastal steamers on the way from Siam to Singapore entered an eastern channel, anchored behind the custom house, unloaded and reloaded, and then proceeded to sea through the western channel. Now everything has been changed, for the monsoons have made a low sandbank of the island which has spread out to such effect as to have formed a lagoon across the mouth of the river, leaving only a small opening for the passage of launches and lighters. The custom house and the coconuts have disappeared ; and steamers must anchor outside at a distance of at least two miles from the landing place. In the monsoonal season Kelantan has been cut off entirely from outside communication for three weeks or a month at a time by the heavy seas breaking at the mouth of the only channel available. It is difficult to forecast what will happen unless a monsoon of exceptional violence follows the example of some of its predecessors and washes a new channel or entirely removes the sand-bank, because the lagoon which has been formed is being filled so rapidly with silt from the river that even the shallow-draft launches which traverse the rivers already find it difficult to cross the lagoon from the river mouth to the Tumpat jetty.

A railway is under construction and will eventually connect the Siamese system with that of the Federated Malay States by traversing the length of Kelantan and making a junction at Kuala Lipis in Pahang. For carrying out the necessary extensions in Siam to connect with Kelantan, and also to make another such extension on the west coast, the government of the Federated Malay States advanced four million pounds sterling to Siam. For a considerable time past trains have been running from Tumpat to Tanah Merah, 36 miles inland ; and a branch line has been completed from Pasir Mas on this line to the border of Siam, where a junction should have been completed by this time with the Siamese system. It will be eight years or more before a junction with Kuala Lipis will be made, as there is much tunnelling to be done between Kuala Lebir and the Pahang border. So strange is the policy of the Federated Malay States government in some things that their railway department, which is carrying on the construction of the line in Kelantan, states that neither passengers nor goods will be carried beyond the present terminus, Tanah Merah, until the whole line to Kuala Lipis has been completed. Thus will the development of Kelantan be delayed by officialdom.

Kota Bharu may be reached in six miles by rail and ferry from Tumpat or in eleven miles by launch or native craft. Above Kota Bharu the Kelantan river is navigable throughout its length at all seasons by light-draft launches and lighters, as are also the Lebir for twenty miles and the Galas for 20 miles above their junction at Kuala Lebir, so that one may proceed upstream some 82 miles by branching off at Kuala Lebir into either the Lebir or Galas rivers. Beyond that distance the rivers are broken by rocks, rapids, shallows and sanbanks ; and for the two months immediately preceding the rainy season are passable for only the lightest of native craft. During a great part of the rainy season, when the rivers may be expected to rise anywhere from sixteen to thirty feet above normal level, it is practically impossible for

native craft to go upstream, because the flow of the river is too rapid for oars or paddles to be effective, and there is too great a depth of water for poling; the thick jungle prevents the passage of boats along the edges of the flooded area. Therefore anyone



Silk Weaving, Kelantan

engaged in prospecting for gold on the upper Galas, or for tin near the source of the Nenggiri, could quite easily be cut off from efficient supplies of food and mining stores for four or five months in the year.

As Kelantan possesses only a very meagre mileage of roads, and as these roads are only lightly constructed and badly maintained, and are designed to serve the flat lands mostly planted with rice, very little development, from a mining point of view, can be expected until the railway has been opened, roads made, and tracks cut to districts now practically inaccessible.

The census of 1911 showed Kelantan to have a population of 286,751, of which 269,000 were Malays and 10,000 Chinese.

GEOLOGY.—Very little is known geologically of Kelantan; and there is no work published which deals with Malaya as a whole or the whole of any one state. Kelantan is so deeply covered with soil, so much of the country is dense jungle, and the outcrops of rocks are so few that geological examination and prospecting for minerals are difficult matters. The main backbone of mountains, which runs north-west to south-east down the Malay Peninsula, is composed of granite, and there are many subsidiary ranges east and west of this. It is stated that the Tahan range, on the boundary of Pahang and Kelantan, is composed of conglomerates, quartzite, and shale, while in Pahang conglomerate and sandstone ridges are found at the foot of the main granite range. A belt of limestone is said to cross the peninsula from Malacca to the coast of Kelantan; but the limits of this belt, if it exists, have not been demarcated. There are many outcrops of limestone; and limestone hills and cliffs, containing large caves whose floors are deep in the guano of bats, are frequently met with in Kelantan; but so little survey work and exploration have been done that the extent of the limestone belt is at present unknown. Even the maps which have been supplied by the government have been found to be grossly inaccurate; and my own experience has been that the least inaccurate maps are those which were prepared by the Duff Development Company for its private use. The most reliable map I was able to purchase from the government was, I believe, mostly compiled from one originally made by the Duff Company, to whom in all things relating to the opening up and development of Kelantan the present white population of the state owe many thanks, a fact which many of them seem to ignore or forget.

Apart from the limestones, quartzites, shales and conglomerates already mentioned, one finds clays, slates, schists, sandstones and granites, the last being predominant.

MINING OPERATIONS.—In spite of the difficulties of prospecting, the Chinese appear to have been through the country long ago; and at the only two places where lode-mining is known to have been attempted—near the Sokor river and at Kundor, near Pulai—the surface had already been prospected and sluiced for gold; but the lodes there had been allowed to remain otherwise undisturbed. In the neighboring states of Pahang and Trengganu the weathered outcrops of such lodes as have been found to exist there had been worked, without exception, by Chinese or Siamese in the years long gone by; and many hold that the most successful method of lode-prospecting is to follow the old native workings.

As the population of Kelantan is mostly confined to narrow strips along the banks of the main rivers, and as the Malay, as a rule, is either afraid or disinclined to go far into the jungle, very little information is to be obtained from them with regard to anything in the country except in close proximity to their homes; but it is possible that, when the country has been opened up by the advent of the railway and the population has become denser, further old workings will be found which will lead to the opening up and development of large ore-bodies lying in country now given over to tigers, elephants and panthers.

The Duff Company spent a large amount of money in prospecting and in dredging the river bottoms; but none of its mining ventures was attended with lasting success. It would appear that the dredges gave variable results, rich periods of work being much interspersed with very lean ones; the four dredges at work seem to have lacked efficient supervision from headquarters, and the gold returns to have been most erratic.

THE AUTHOR'S JOURNEYS.—A great deal of tunnelling and shaft-sinking was done by the Duff Company near the source of the Sokor river, on what are often referred to as the galena mines. Operations were carried on there until 1907. While awaiting the fulfilment of certain business negotiations with regard to a concession of two hundred square miles, which was the primary cause of my presence in Kelantan, I arranged a visit to these old mines. As the Sokor river enters the Kelantan river about midway between Tanah Merah and Kuala Lebir, I sent forward the leader of my party to engage men and boats and meet me at the mouth of the river. As I was on the point of leaving Kota Bharu to join the expedition, word was sent down that the men who had been engaged were afraid to proceed when they found that the expedition was to traverse the "poison" belt—the bad man's country—where it is said that one can arrange for the death of an enemy for half-a-dollar and where most of the native potions and poisons are compounded. I happened to mention the matter to the chief police officer, who sent a party of native police with me, and we proceeded upstream, engaged new men and boats, and started shortly after daybreak from the mouth of the river. We took the Duff Company's old route to the mine, poling up the Sokor river and then walking six miles overland. Estimates of the river distance were very variable, and, as before stated, the maps available very inaccurate. However, our boat journey occupied a good long day and a half; and, as the river at the time was fairly high, good progress was made until the middle of the first day. After that the river became a series of rapids, shallows, sandbars and deep pools, which meant wading in the water a great part of the time, digging passages through the shallows, and all hands hauling the five prahus which formed our means of transport. It was no uncommon thing to find the bows of one's prahu lying in ankle-deep water, while the stern projected over the edge of a steep bank of granite sand in a depth of over fifteen feet of water. We reached our river destination during the second day and pitched camp; and our six-miles tramp next day brought us to the deceased mining camp. This tramp was over the old wagon road of the Duff Company; and, although then devoid of bridges and much overgrown with jungle, the track was in otherwise excellent condition. As far as jungle growth was concerned, our way had been made easy by an adult and a bady elephant who had evidently traversed nearly the whole of the road the day before and whose beds of the previous night we passed on our journey. My natives were interested, but not afraid,

when we met with the elephant tracks. It was not until we crossed the spoor of a sladang (wild buffalo) that I had difficulty with my bearers, for the sladang is regarded as the most dangerous animal in the peninsula. It is a matter of common report in the East

House of a Malay Noble

that he who goes out to seek sladang must keep a watch to the rear as well as to the front, the sladang becoming the hunter instead of the hunted if sufficient care is not exercised.

Various tunnels into the hillsides were noted; but all that remained of the former main engine shaft was a jungle-covered hole and some rotting timber. History relates that after the mine had been closed, and even before the last of the stores had been carried to the river bank, the Malay natives had swarmed in and stolen every bolt and piece of iron from the headgear, even going part way down the shaft in search of bolts, etc.

No galena could be seen on any of the old dumps we were able to find; but records show that a parcel of about 57 tons was bagged and sent to the smelters just prior to the closure of the mine. The dumps examined showed that the bulk of the material mined must have been of a pyritic nature, and the records also show that 80 tons of such ore was dispatched about the same time as the galena. One of the old assay books discovered at Kuala Lebir showed the large amount of exploratory work which had been carried out, and that as the work proceeded the ground was regularly sampled and the results carefully tabulated. Most of the assays from the "galena deposit" show gold and silver values only; and some of these are of considerable richness. For example, the following values are taken from a width of ore varying from two to five feet: Gold 64·8 dwt., silver 1·6 oz.; gold 38·4 dwt., silver 2·3 oz.; gold 44·0 dwt., silver 4·0 oz. The following assays are recorded from "Manson's deposit": Gold 1·6 dwt., silver 4·9 oz., lead 12·5%; gold 2·8 dwt., silver 8·2 oz., lead 36·0%; gold 1·6 dwt., silver 3·3 oz., and lead 14·5%. The records also mention the diamond-drilling of vertical holes in the slates; but encouraging results do not appear to have been obtained. It would seem that the whole mining proposition at this place was killed by bad transport arrangements. A road from the Kelantan river to the Sokor mines, say, twenty miles in length, and then extended to the Pergau river, say, another five miles, would not only have served the mines then being worked, but would have opened up a most promising belt of country extending up to the Tomo (Siam) alluvial goldfield. In spite of the fact that labor was considerably cheaper in 1907 than it is to-day, it cost the Duff Company approximately £80 to bring a moderate-sized boiler from the mine; and the smaller items of machinery, weighing from 8 cwt. to 1 ton, were contracted for at a rate of about 3s. 10d. per cwt. The slowness of river transport may be gathered from the manager's statement that loaded prahus which had left the head of the river on the Tuesday could not be expected back before the following Saturday.

My return down stream in our lightly-laden prahus and with the channels dug on the up journey still available was comparatively rapid.

Upon another occasion I travelled on foot from the Kelantan to the Bertang river, a tributary of the Sokor, and found native mercury in the bed of the stream for quite a considerable distance in the Duff Concession. Later on I took an expedition up the Sokor river, where I was informed that quicksilver could also be found, for, if the metal could be found in both rivers, it meant the probability of an extensive mercury-bearing belt. On this occasion we travelled up the Sokor to our old river camp, but, the river being lower this time, we were forced to leave our largest prahu part way up and finish our river journey in relays. Arrived at our destination we set out for the spot where our guide said he had found mercury before; but none was to be found on this occasion, and it turned out that our guide had not been up-stream to the supposed spot for at least eighteen years. He had with him a specimen of galena which he said he had found in a hole 8-ft. deep some twenty-two years before, and was much incensed because I would not go with him to search for that 8-ft. hole which, according to the location given by him, must have been within the area afterward prospected and worked by the Duff Company.

Our last night at the Sokor was somewhat unpleasant, as the river began to rise and, having left our largest prahu some distance down stream, we had not sufficient carrying capacity for the whole of our men, kit and provisions. We were therefore faced by a raging torrent on one side and a jungle infested with leeches and wild beasts on the other, and of these the leeches were the worse, while the rain was coming down as only it can come down in the tropics. However, we managed to hang on until daylight, when we built some bamboo rafts and floated away on the tide of the flooded river.

I made expeditions to other places where tin was supposed to exist within easy reach, but found, as a rule, only iron sands.

Just before the wet season was expected I set out with my guide in two prahu-dowds for the upper waters of the Galas in search of that Golconda of Kelantan, the Kundor mines. A prahu-dowd is the largest form of native up-river boat; ours were about 50-ft. long and 5-ft. wide, having a covered-in living-room in the centre about 14-ft. long but only 4½-ft. high. Each was poled along by four Malays under the direction of the helmsman, who steered by means of a long oar lashed to the stern.

Prior to setting out on this expedition I went to Kota Bharu and asked the British adviser whether any of the land up the Galas river had been granted for mining purposes. The British adviser referred me to the district officer up-river at Kuala Krai. An inquiry from the said district officer received a reply that there were no papers in his office which showed that any of the land had been alienated for mining and that therefore al lthe land was open to me; but he advised me to take out a prospecting licence before starting. A Kelantan prospecting licence states clearly the location of the area to be prospected; but, as neither my guide nor I knew the exact location of the Kundor mine, but were to be met by local men sixty miles above Kuala Krai who were to take us to the spot, it was impossible for me to take out a prospecting licence at that moment; but I agreed to send a special messenger down for a licence as soon as I had located the old workings. This I did, applying for an area of 4,000 acres. I was away with my expedition for month, living and travelling in my prahu, and after having done some track-making and opening-up of the prospect, was compelled to return on account of the serious illness of my guide and also by the rapidly-approaching rainy season. On my arrival at Kuala Krai the district officer informed me that after my departure the British adviser had sent him some papers which tended to show that the land for which I had applied had already been alienated and was not therefore available. My protest to the British adviser brought the absurd reply that he was inclined to think that if I had obtained my prospecting rights before proceeding upstream from Kuala Lebir I should have avoided this loss of time and money.

My river journey of seventy miles from Kuala Krai to Pulai took sixteen days; and I had not travelled very far above the junction of the Pergau river before the difficulties of transport became apparent. The river had become impassable for anything but light-draft prahus; we encountered rapid after rapid, up which our prahus often had to be dragged with long ropes; and through many rocky and sandy places we had to dig channels for our craft.

The Chinese town of Pulai, which is known to have existed for over a hundred years, is a great contrast to the Malay kampongs with their jungle-constructed houses. In Pulai the houses are two and three storeys high, the thick walls being constructed of a lime concrete of rounded pebbles and river sand. The natives mostly make their living from alluvial mining; but the Kelantan government gets very little in the way of taxation from the district, as most of the traffic is by foot over the border into Pahang.

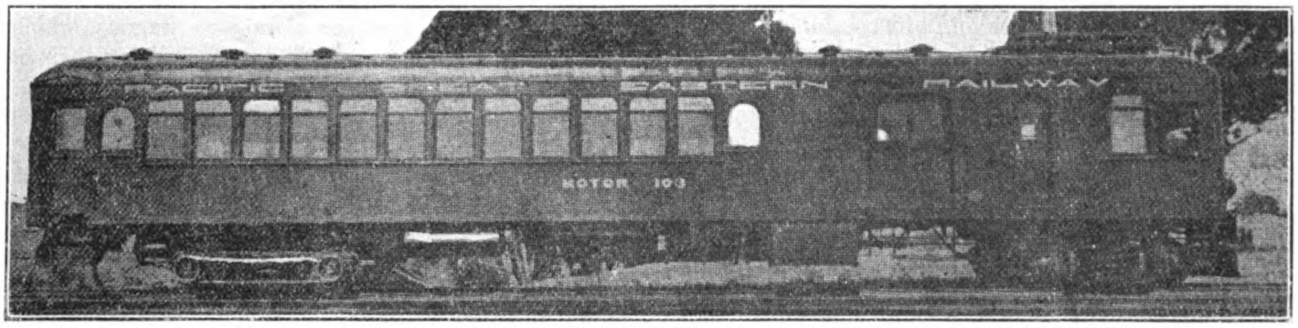
The Pulai Chinese are the remnant of a much larger population of the past. Some hundred years ago the ruling Rajah of Kelantan made over to his son the taxes on rice; these the Pulai Chinese refused to pay and, when the Rajah's son came to enforce the payment, they killed him. In revenge for this a punitive expedition was sent, with the result that most of the Chinese were killed, the Galas river ran red with blood, and was afterwards blocked by rotting corpses. Only a few of the residents escaped by hiding in the jungle; and those are said to be the ancestors of the present population. I had a number of Chinese working for me at Kundor and, although only one or two of them could speak Malay, we soon came to an excellent understanding. I found them a hardworking, jolly, capable crowd, and eight of them worked my prahus downstream for me as far as Kuala Lebir, that being much farther than they had ever been away from Pulai before.

Kundor proved to be about eight miles down river from Pulai; and an inspection showed that much alluvial gold must have been won there. The Chinese had constructed several miles of water-races, and in some cases they had cut these for a depth of 15 or 20-ft. through the granite. The property had been worked by a Dutchman in more recent years, and he had done a fair amount of tunnelling and shaft-sinking before his death. The reputedly richest portion of the property was at the junction of the granite and the slates, and I made arrangements with the Pulai Chinese for the opening up and repair of the old workings at the conclusion of the approaching wet season, only to find on my return to Kuala Krai that the ground was not available.

Coming down stream I stopped, inspected, and sampled several quartz outcrops of good appearance with a view to a return visit at a later date.

The occurrence of a tin lode was rumored on the border of Kelantan and Trengganu, and it is possible that such lode may exist, for in the state of Trengganu the privately-owned Bundi tin mine is reported to have given good returns to its owner. The neighboring state of Pahang gives the only other example of lode tin mining on a large scale in Malaya. In Pahang the Chinese and Siamese are known to have worked the soft outcrops of at least forty lodes. These lodes are in the slates near the junction with the granite, into which they sometimes penetrate. In Trengganu wolfram veins are found in formations of quartzite, schist and shale overlain by clays. The veins are worked only down to old water level, below which the sulphides of iron, copper and arsenic occur. The ore, as sent away, contains 70 per cent. of tungstic acid. Wolfram found in the Federated Malay States is associated with tin; in Trengganu wolfram is found alone.

Alluvial tin is found in limited quantities in Pahang, Trengganu and Kelantan; and it is a surprising fact that so much alluvial tin, shed from the range which forms the backbone of the peninsula, should so far, have been found on the western side and so little on the eastern side of the range. When it is remembered that the Malay States have produced tin to the value of £180,000,000, the small proportion obtained from the eastern states gives much food for thought.—*Mining Magazine.*



Type of Hall-Scott Motor Car, ordered for the British Section of the Kowloon-Canton Railway

Motor Coaches for the Kowloon-Canton Railway

THE Hongkong government is to experiment with motor coaches as a means of solving fast local traffic on the British section of the Kowloon-Canton Railway. Conditions in the leased territory are very similar to those of certain sections of the Western United States, where a cheap system of transportation is necessary to handle the passenger traffic through a sparsely-inhabited district. An order for two motor coaches and one trailer has been placed with the Hall-Scott Motor Car Company of San Francisco, through their China agents (The Northwest Trading Company), and are expected to arrive in the colony in September. The motor cars are 62 feet long, driven by six cylinder internal combustion engines of 150 H.P. using kerosene as fuel, and are guaranteed to develop a speed of 45 miles per hour. The motor coaches have a seating capacity for 60 and the trailer for 80 passengers. The coaches are divided into first and third class, and the trailer into second and third-class sections. The cars will be built of steel, with double roof for ventilating, lighted by electricity and equipped with fans.

This type of motor car has been in successful operation for years on the Pacific Coast, and provides an economical solution to traffic problems where it is inadvisable to add to the locomotive rolling stock.

Panoramic View of Madras Harbor

Madras Harbor Works

THE administration report of the Madras Port Trust for the official year 1919-20 bears testimony to the foresight of those British administrators who, in the eighties, began the work which year by year has steadily progressed until to-day the harbor of Madras is one of the best east of Suez. The modern artificial harbor which now serves as the outlet for the east coast of India combines adequate facilities for handling not only the shipping of the present but also the great expansion which must inevitable result from the development of trade in the near future. The harbor as completed is about three-quarters of a mile square with an approximate area of 200 acres. The width of the entrance is 400 feet at which point the depth of the water at high tide is 39 feet and at low tide 34 feet. The last annual report shows that the year was a record one, the total value of the trade representing 51 per cent. of the sea-borne trade of the whole Presidency and amounted to 36½ crores of rupees compared with 23½ crores in 1913-14. (One crore with exchange at 24 pence to the rupee equals one million pounds sterling.)

During the year 521 vessels, with an aggregate tonnage of 1,166,352 tons, including 276 from foreign ports, 131 from coast ports and 99 country sailing craft, called at the port against last year's figure of 406 vessels of 679,983 tons. The largest vessel that entered the port was the steamer *Neuralia*, of Glasgow, of 9,082 tons gross and 5,656 tons net register, and the vessel with the deepest draft was the s.s. *Banka*, drawing 26-ft. 9-in. forward and 27-ft. 7-in. aft. Passengers to the number of 57,542 arrived at and 59,190 left the port, making a total of 116,732 against 92.654 of last year. Of the 422 steamers that used the port, 182 lay at moorings inside the harbor, 184 used the quays for landing cargo, passengers, horses, etc., 4 used the outside berths for lanidng explosives and combustibles and 6 anchored in the fairway.

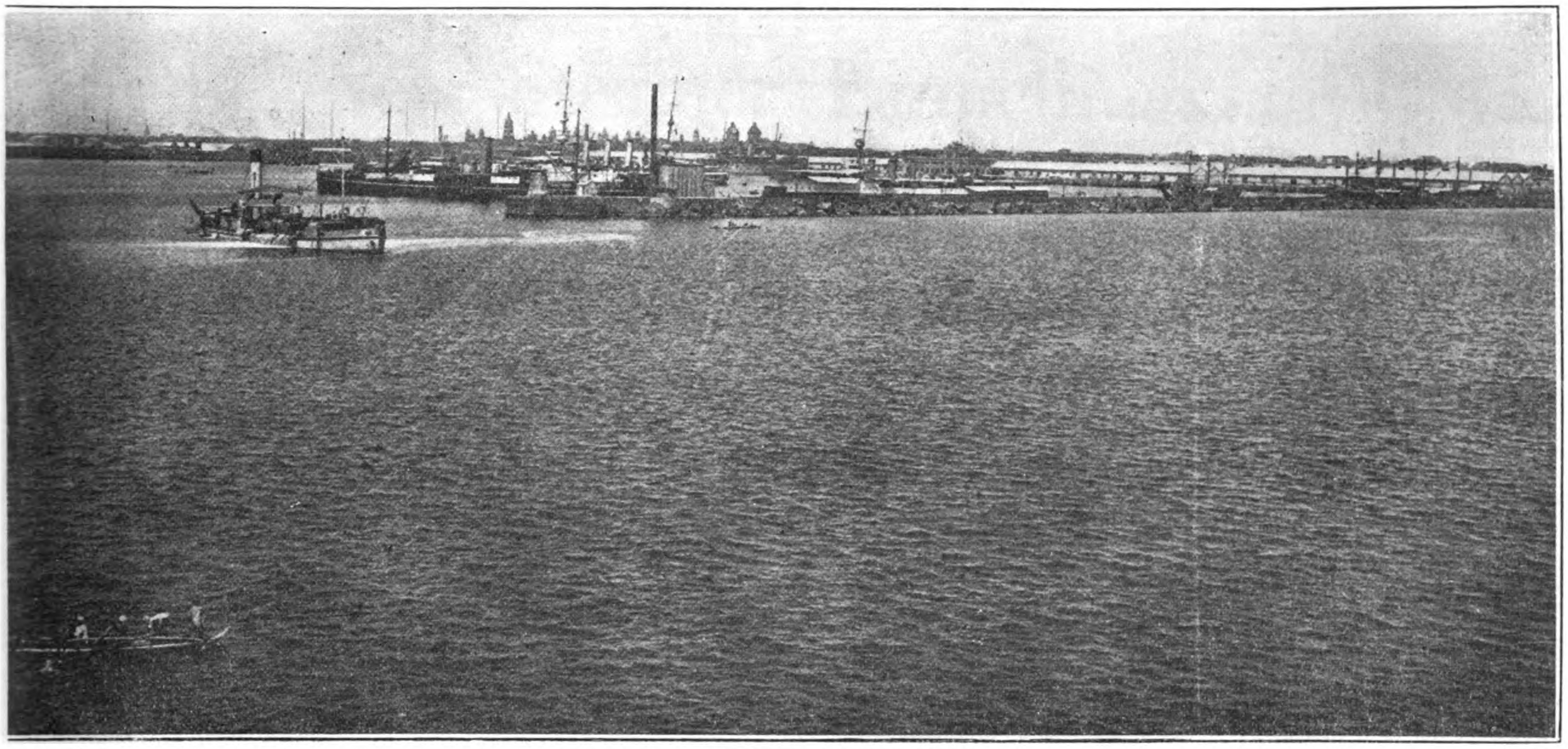
The total tonnage of goods which passed through the port in the year amounted to 878,441 tons, exclusive of 62,123 tons of coal brought in by broad gauge wagons for transhipment to meter gauge wagons for the South Indian Railway against 609,480 tons last year and 797,665 tons in the previous record year 1913-14. Excluding all coal transactions the total tonnage of imports and exports by sea was 739,756 tons against 543,714 tons in 1918-19 and 627,954 tons in 1913-14.

As in other parts of the world, the port authorities had to contend against a shortage of railway wagons, which caused congestion at the wharves, the importers leaving their cargo uncalled for to save warehouse charges. This was remedied by imposing a penalty, and when the importers saw that the port authorities were determined not to allow their transit sheds to be used for storage purposes, they did their best to get the cargo cleared, and by extending free days, the whole of the cargo was disposed of without the imposition of the threatened penalty.

The Madras port authorities gained much valuable experience during this rush of traffic, and they now are confident that with adequate wagon supply they can easily handle 50,000 tons of grain a month, without interfering with the ordinary traffic of the port.

As an example of what can be done in unloading a vessel, the case of the s.s. *Ranee* is given. This vessel arrived alongside the wharf on August 13 with a cargo of 98,818 bags of grain weighing 7,600 tons, and working from 7 a.m. to 6 p.m. She was emptied on August 21, discharging on the quay on one side and into lighters on the other, the cargo being lifted from the lighters by the hydraulic cranes at either end of the berth. With the exception of about 3,000 bags removed by carts, the cargo was loaded direct into the railway wagons as it was landed.

The warehouse accommodations cover 12.30 acres, and the program for improvement includes considerable addition both in warehouses and transit sheds. A large quantity of plant held up in England during the war was received during the year, the chief items being a third hydraulic engine for the power house and four travelling hydraulic luffing cranes, 50 feet maximum radius, three of them having a lifting capacity of 35 cwts. and one of 5 tons. These cranes are installed on the West Quay and work direct from

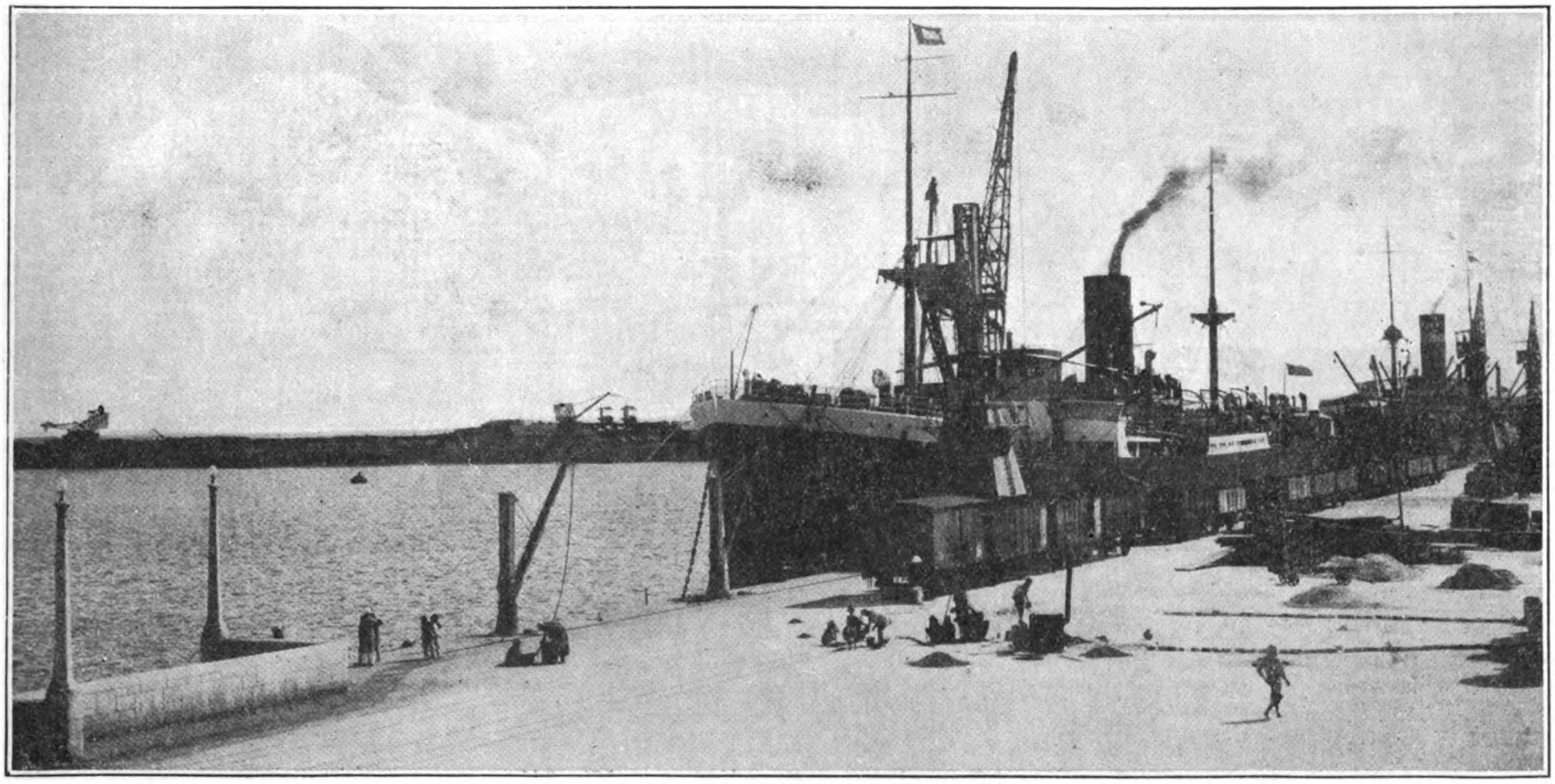


Panoramic View of Madras Harbor—2

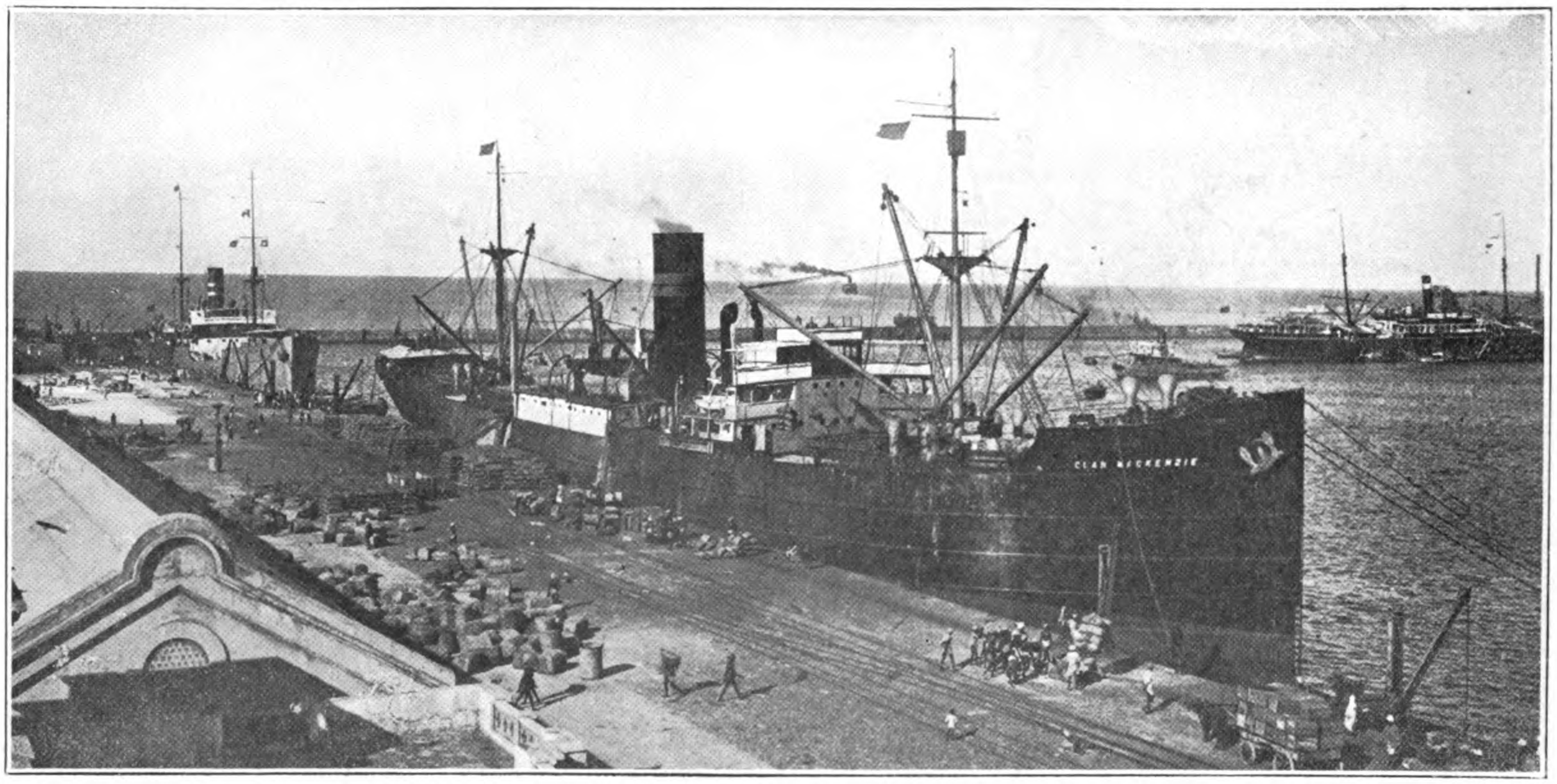
the ship's holds to the quay or railway wagons. The program for the future includes the provision of at least 12 more cranes of the same type.

Work on the breakwater progressed steadily during the year. The semi-permanent head composed of horizontal block work was completed to 10 feet above water, adding a length of 67 feet and making the present length of the sheltering arms, 1,600 feet. In this work 181,146 cubic feet of block work were used, making a total of 440,009 cubic feet of block work built into position since the commencement of the rebuilding. One hundred and twenty-two lineal feet of mass concrete apron or 34,492 cubic feet of concrete laid since the commencement. During the year 154 blocks, 64,072 cubic feet in volume, were manufactured. The steel work for the 48-foot diameter well caison, which is to form the permanent head to the sheltering arm did not arrive till November. The cutting edge and four strakes of the caisson, a total height of 25 feet, were erected on the slipway and launched last year and the work is now well towards completion.

A feature of the port is the facilities provided for discharging bulk oil from tankers, 44 steamers using the north and south piers for this purpose. During the year under review, the pipe lines were relaid and a new valve house built. The system consists



Madras Harbor—West Quay Looking South

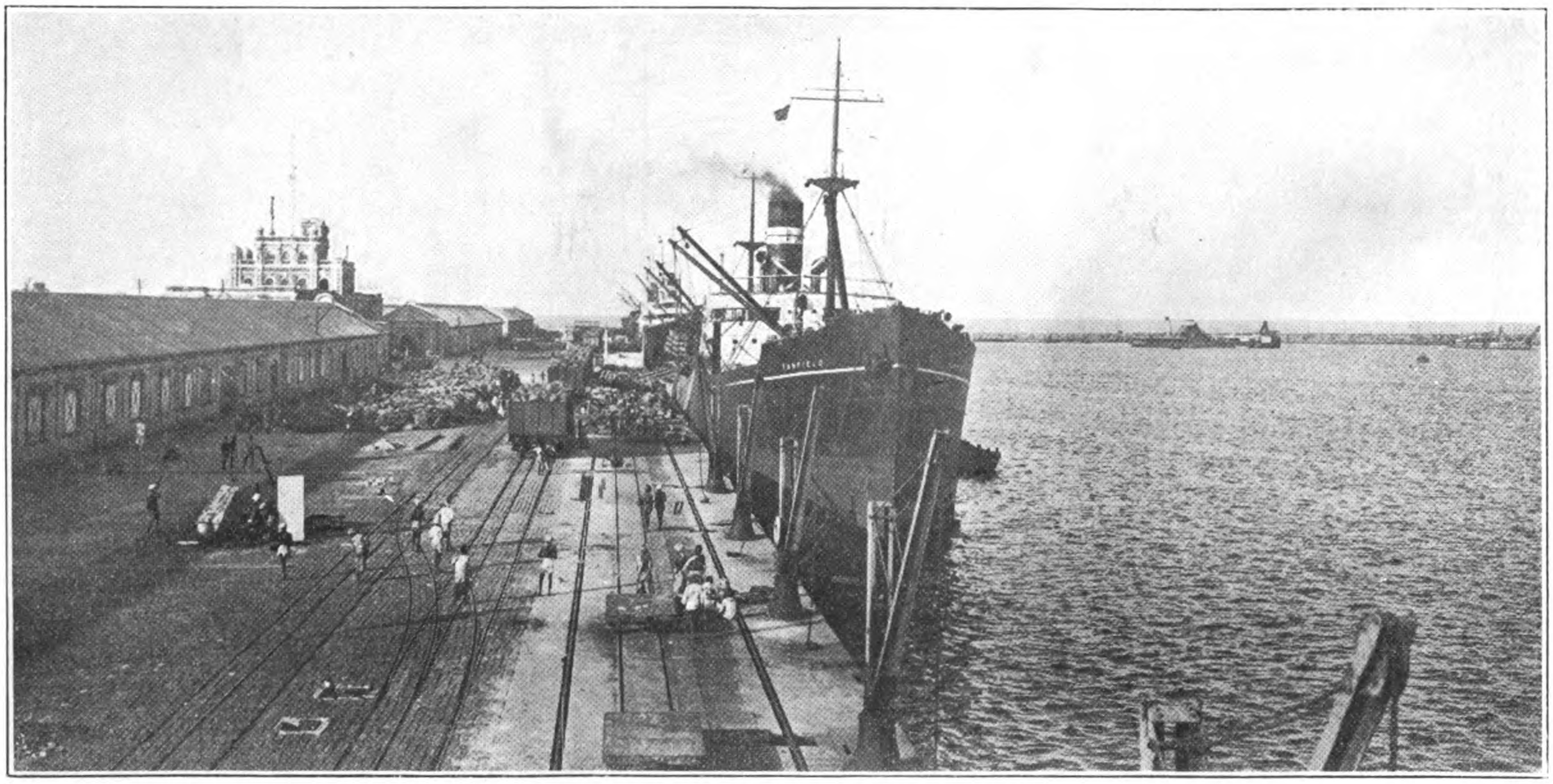


Madras Harbor—Ships Taking in Cargo at Berths Nos. 1 and 2 West Quay

of three 8 inch pipes leading from the discharging points on the pier to the valve house, the three lines being used for white oil and petrol, white oil and kerosene and fuel oil respectively. At the valve house are discharging connections enabling the oil companies to couple up their pipes to any of the discharge pipes.

Two dredges are at work inside the harbor deepening berths. The report gives a table showing their work and the cost per ton of handling material. For instance, in the fourteen years 1906-20, the dredger *Madras* averaged 1,194.4 tons per day at a cost of 6.15 annas per ton, or 9¼ pence (about 18½ cents gold), while in the year under survey, the average day's work was 850 tons at a cost of 17.96 annas, or 27 pence (54 cents gold) excluding interest and depreciation, which brought the cut up 23.30 annas, 35 pence or 70 gold cents. The other dredger showed a lesser cost per ton, averaging 13.07 annas or 13.65 with interest and depreciation, a total of 20.5 pence or 41 gold cents. The increased cost are due to higher costs of plant and materials and less number of days the dredger was able to work.

Sir Francis Spring, K.C.I.E., the engineer-chairman of the Port Trust, retired on a pension in 1919, after fifteen years of service. He was succeeded by the Hon. Mr. H. H. G. Mitchell, O.B.E., M.I.C.F.



Madras Harbor—Loading Ground Nuts at the West Quay

Some New Steamer Launchings in China

A New Steam Tug

THE Hongkong & Whampoa Dock Co., Ltd. have launched the *Henry Keswick*, a steel twin-screw ocean-going tug and salvage steamer, which when completed will be placed in the Company's own service. The launching ceremony was gracefully performed by the Hon. Mrs. John Johnstone, the wife of the chairman of directors of the Company.

On commissioning, shipping interests in the Far East will be well served, for as may be seen from the following description, as a salvage steamer the *Henry Keswick* will be second to none east of Suez, and indeed may claim to rank with the most powerful tugs in home waters.

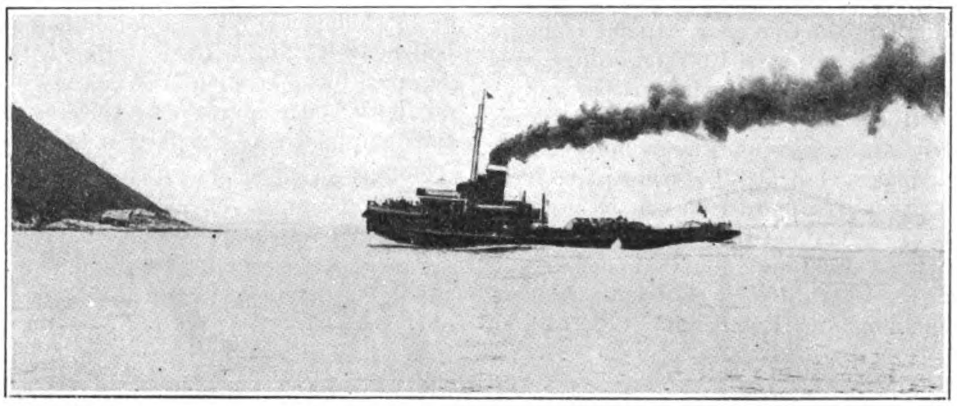
With long top-gallant forecastle, high casings, boat deck and navigating bridge, the *Henry Keswick* is well fitted for encounterring the heavy seas of typhoon and monsoon seasons. The fuel capacity of this vessel of 362 tons of coal and 181 tons of oil represents at full speed 5,500 knots and at cruising speed 7,000 knots steaming radius.

The principal dimensions are as follows, viz.:—

Length, overall	174′ 6″
Length, B.P.	165′ 0″
Breadth over fenders	36′ 7″
Breadth moulded...	34′ 0″
Depth moulded	17′ 0″
Height of Machinery Casings, Boat Deck and Forecastle	7′ 6″

The fact that the machinery and boilers are in separate watertight compartments affords an excellent coaling arrangement and towing hook position amidships, thus guarding against any large change of trim between the fully laden and spent conditions.

Ample sub-division is provided forward and abaft the machinery spaces by oil-tight flats about 9-ft. above keel, and by the five bulkheads to deck ; in all nine large and four smaller buoyant compartments.



The Steam Tug "Henry Keswick"

Oil fuel or water ballast may be carried in the after peak and in the three deep tanks, and 68 tons of fresh water in the fore peak, under the cross bunker, and machinery seating.

The ballasting arrangements for about 90 tons of salt water in two tanks forward and 110 tons in two tanks aft ensures a good displacement and easy means for trim correction when on harbor duty.

Two salvage holds have a bale capacity of 9,900 cubic feet, the forward hold being served by a 7-in. by 12-in. steam winch and 34-ft. 0-in. steel derrick tested to 20 tons, and salvage operations amidships by two 7-in. by 12-in. steam capstans, and derricks of three tons capacity. A third teams capstan having cylinders of 7-in. diameter and 12-in. stroke is fitted for warping purposes at the after end of vessel.

The equipment is in excess of classification requirements a precaution adopted by the Dock Company after many years experience in salvage operations. The stockless anchors are well protected by housing in specially designed hawse pipes, permitting a free use of the bow fenders. An extra heavy anchor of Hall's admiralty type, with stock is conveniently stowed on deck for use when on salvage work.

Saloon accommodation on the forecastle deck and navigating bridge consists of five double-berth cabins, two bath-rooms and pantry. As occasion demands, the sofa-berths will accommodate an additional seven operators. The rooms are well ventilated and lighted. Tables can be laid for 14 in the dining saloon. Iron bunks for a crew of 24 are fitted in the forecastle.

Access to the engine and boiler rooms is entirely under cover of the side-enclosed boat deck, steel entrance houses being fitted on the upper deck port and starboard as a precaution when in a following sea. An 8-in. steel trunk through the cross bunker is fitted between the engine and boiler rooms.

Steam steering gear abaft the engine-room is controlled from the navigating bridge, all rods and gearing being led through the machinery spaces.

The machinery consists of two sets of triple-expansion direct-acting surface-condensing engines having cylinders $15\frac{3}{4}$-in.-$26\frac{1}{2}$-in.-43-in. diameter by 30-in. stroke, capable of developing 1,800 I.H.P. (actually 1,950 at trial).

One condenser is fitted common to both engines, with two large exhaust shut-off valves so arranged that the condenser may be used for auxiliary purposes when in port or when engaged on salvage work. One Edward's type air pump, one bilge and one sanitary pump on each main engine are worked by levers and crosshead off the L.P. engine crosshead.

Boilers for either coal or oil fuel are two in number 15-ft.0-in. internal diameter by 10-ft. 6-in. long, each being fitted with three Fox's corrugated furnaces 3-ft. 8-in. internal diameter, natural draught, constructed to board of trade and Lloyd's requirements for a working pressure of 180-lbs. per square inch.

The feed pumps consist of one set of Weir's twin pumps working in conjunction with a float tank. Two feed water filters are provided, one for each engine.

One 25-ton Weir's evaporator is fitted in engine-room together with a large Quiggin's distiller for fresh water purpose.

Two pumps for water ballast or oil fuel are fitted, one in the engine-room and one in the forward part of stokehold.

A "Merryweather" patent vertical double cylinder steam fire pump is fitted in the engine-room, designed to deliver 750 gallons per minute, with two hydrants on deck one port and one starboard taking six lengths of hose.

The salvage gear consists of a large compound vertical double-acting steam engine of 88 B.H.P., made by Messrs. Browett Lindley & Co., Ltd., driving a 59 K.W. direct current shount wound 100 volt generator, made by the English Electric Co. This generator supplies current to two 8-in. and two 6-in. Merryweather submersible electrically driven pumps, provided with suction and discharge hose, all the necessary foot valves, flap valves, couplings, electric cables, etc.

The vessel is fitted with a powerful wireless set on the boat deck, and is electrically lighted throughout, current being supplied by a 20 H.P. (13 K.W.) De Laval steam turbine dynamo.

Upon completion, Lloyd's highest class 100 A.1 with minimum freshboard will be awarded, the *Henry Keswick* having been specially surveyed during construction by Messrs. Gardiner and Morrison, surveyors to Lloyd's Register of Shipping. Certificates for Imperial registry, equipment and tonnage will be granted by Mr. William Russell, government marine surveyor, Hongkong.

The total salvage equipment, coal, oil, fuel, fresh water and stores will be 700 tons.

The S.S. "Kwangchow"

ON June 9th, there was launched from The Taikoo Dockyard at Hongkong, the steel screw steamer *Kwangchow*, a finely modelled vessel of the following dimensions, length 321 feet, beam 44 feet, depth moulded 23 feet and having a gross tonnage of about 2,500 tons. The vessel is built to the order of the China Navigation Co., Ltd., for their Bangkok trade, and has two decks, a long combined poop and bridge deck and top gallant forecastle. Accommodation is provided on bridge deck amidships for the officers, engineers and first-class foreign passengers. Chinese first-class accommodation is situated at the after end of the upper deck. The 'tween decks have also been made suitable for carrying passengers. The cargo gear consists of eight steam winches and derricks capable of dealing with weights up to 30 tons. The steam steering gear is of the "Wilson Pirrie" type fitted in house aft and controlled from amidships by telemotor gear. The cellular double bottom is constructed for the carriage of oil fuel and the force and after peaks can be used as trimming tanks. The propelling machinery consists of a set of "Brown-Curtis" type of turbines, comprising of H.P. and L.P. turbines combined with astern turbines, driving a single propeller through double reduction gear, capable of maintaining a total combined shaft horse power of 1,600 on ordinary sea service, with the turbines running at 3,500 revolutions per minute and propeller at 102 revolutions per minute. This machinery is supplied with superheated steam from one large multitubular marine boiler at a working pressure of 200-lbs. per square inch. The boiler is fitted so that either coal or fuel oil can be used for generating steam under forced draught on the "Howden" system. The vessel is also fitted with a "Cochrane" donkey boiler and all the latest auxiliary machinery and is lighted by electricity throughout. Messrs. Scotts' Shipbuilding and Engineering Co., Ltd. of Greenock are the builders of the turbines and gearing while the boiler and all appurtenances have been made by the builders of the vessel. The naming ceremony was performed by Miss Edkins.

The S.S. "Kiangshun"

THE s.s. *Kiangshun*, the latest addition to the fleet of the China Merchants' S. N. Co., for their Yangtze River service, was successfully launched from the Pootung yard of the Shanghai Dock & Engineering Company.

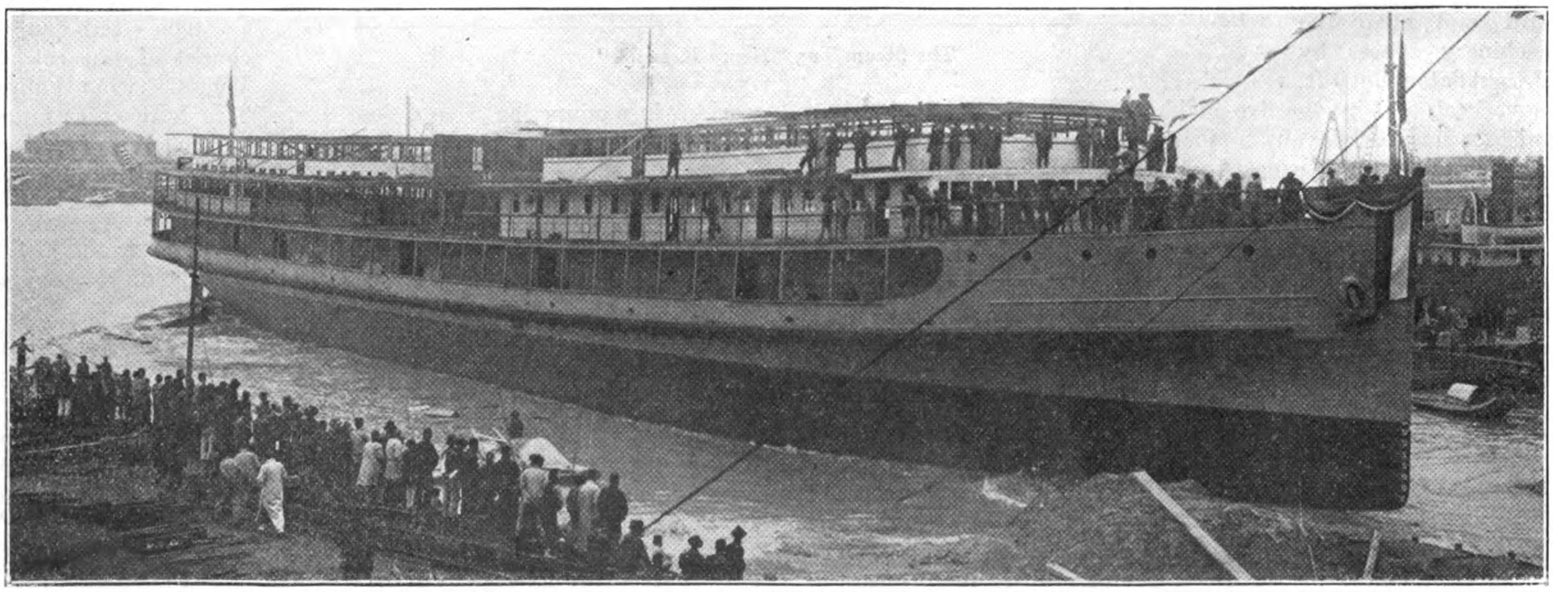
She measures 340-ft. long by 48-ft. moulded breadth and 24-ft. 6-in. moulded depth to upper deck and carries 2,150 tons deadweight cargo on a light draft of 12-ft. 6-in.

The Chinese saloons and passenger accommodation is placed on the upper deck and large first-class saloons and state-rooms for 28 first-class and 40 second-class passengers forward, and 34 second-class and 164 third-class aft; the petty officers and crew are comfortably placed in the forecastle and the compradore staff and other supernumeraries are placed amidships. On the deck above the upper deck is placed the first-class European accommodation consisting of a large and luxuriously appointed saloon forward and state-rooms for 16 passengers; the officers and engineers are comfortably placed amidship and the after end of the deck is occupied by a large saloon and state-rooms for 56 second-class passengers.

The deck above the European accommodation is arranged for navigating purposes with large wheel house and spacious rooms for the captain and pilots.

The propelling machinery of about 3,200 indicated horse-power built in the Dock Company's workshops consists of two independent sets of triple-expansion surface-condensing engines each fitted with the usual pumps and direct-acting steam and oil-reversing gear, while steam is generated in two large cylindrical multitubular boilers 16-ft. 9-in. diameter fitted with Howden's forced draft and designed for a working pressure of 180-lbs. per square inch and an auxiliary boiler of the same working pressure for general service—the main boilers are the largest so far made in China.

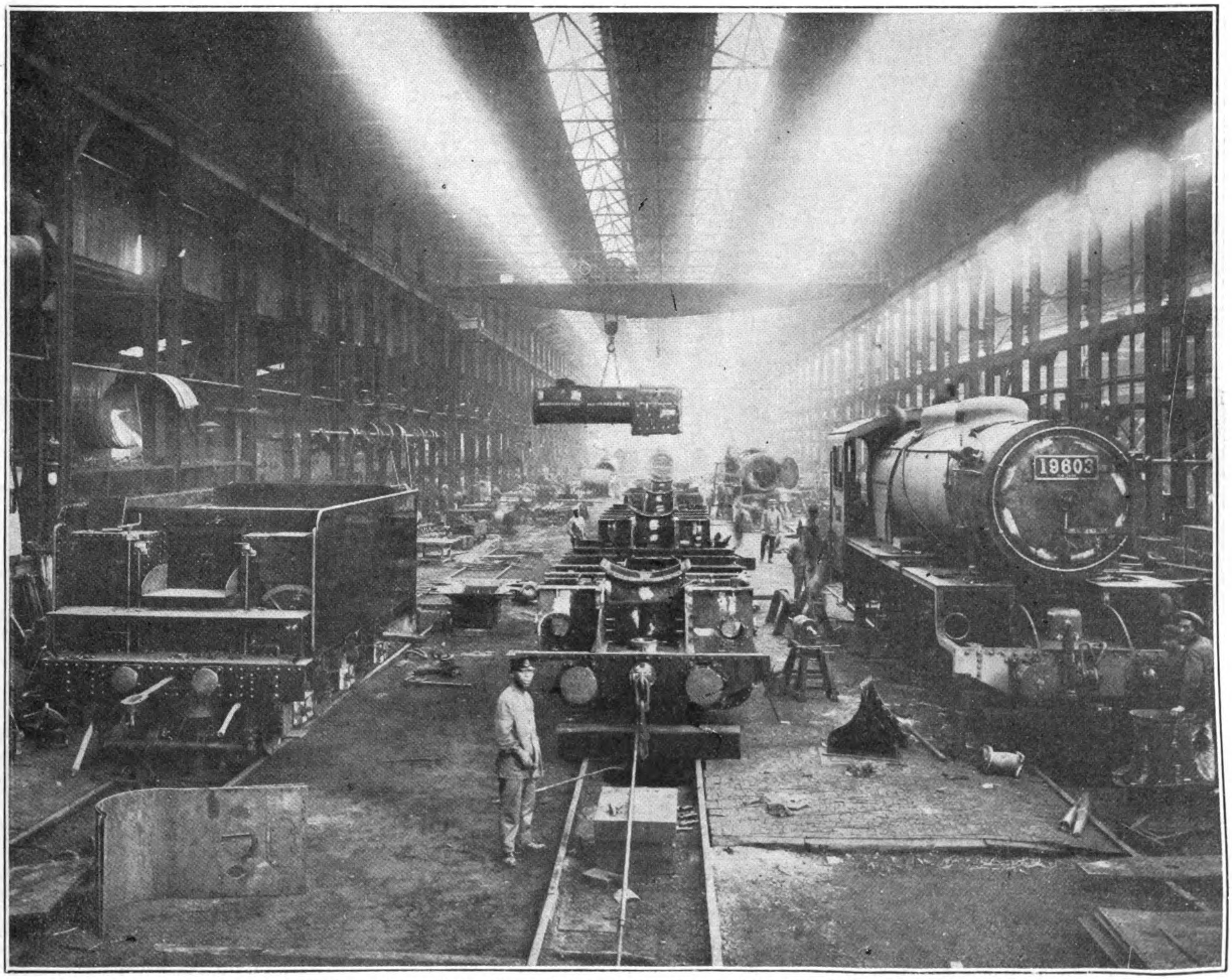
The auxiliary machinery includes independent centrifugal circulating pumps, Weir's feed and general service pumps and feed heater, Weir's ballast pumps, sanitary pumps, two large steam-driven dynamos for lighting and fans, steam steering gear, steam windlass, steam capstan aft and other fittings as usual in a steamer of this class.



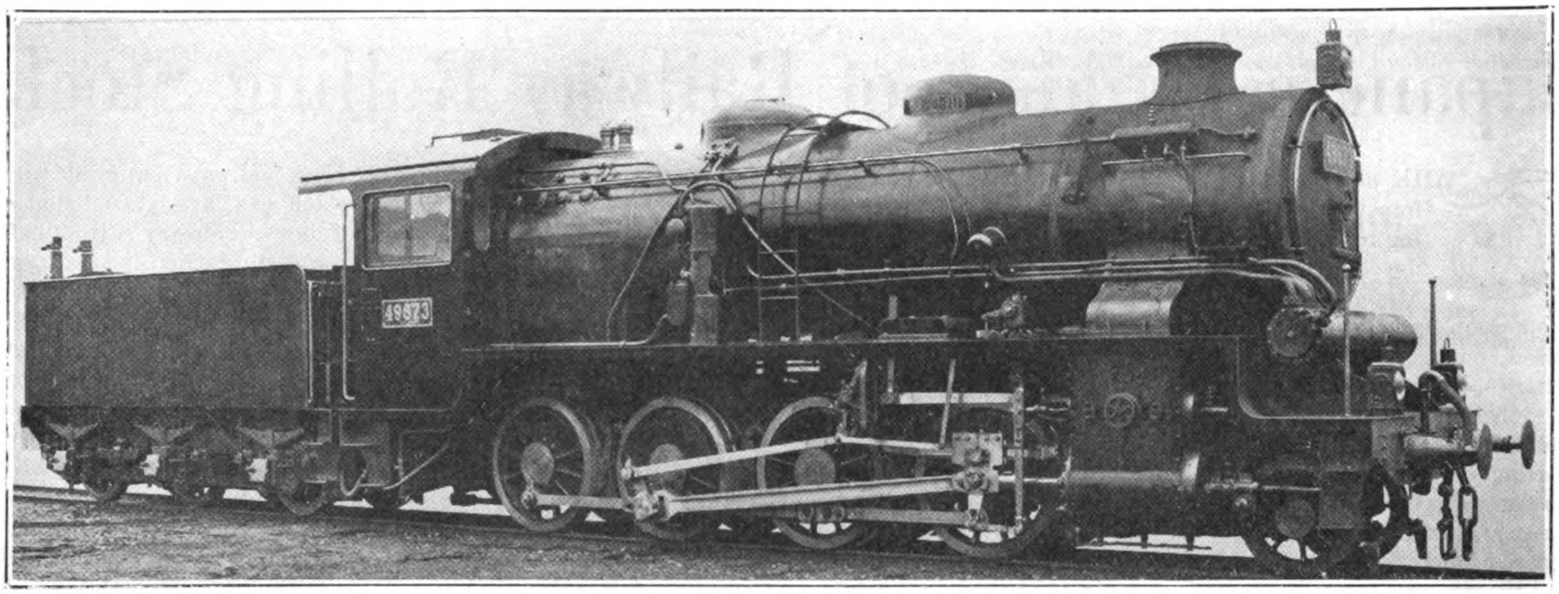
Launching of the China Merchants S. N. Co.'s New Yangtze River Steamer "Kiangshun" at the yards of the Shanghai Dock and Engineering Company.

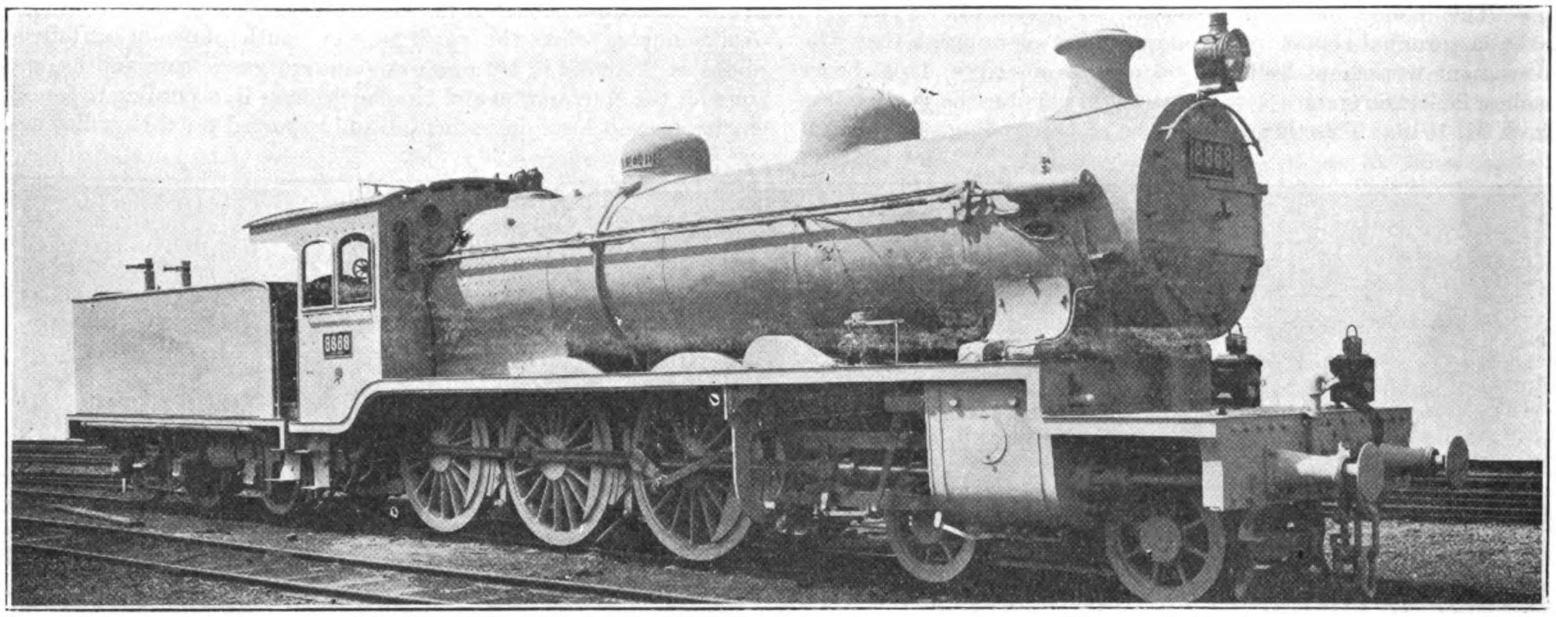
Japanese Builders of Railway Rolling Stock

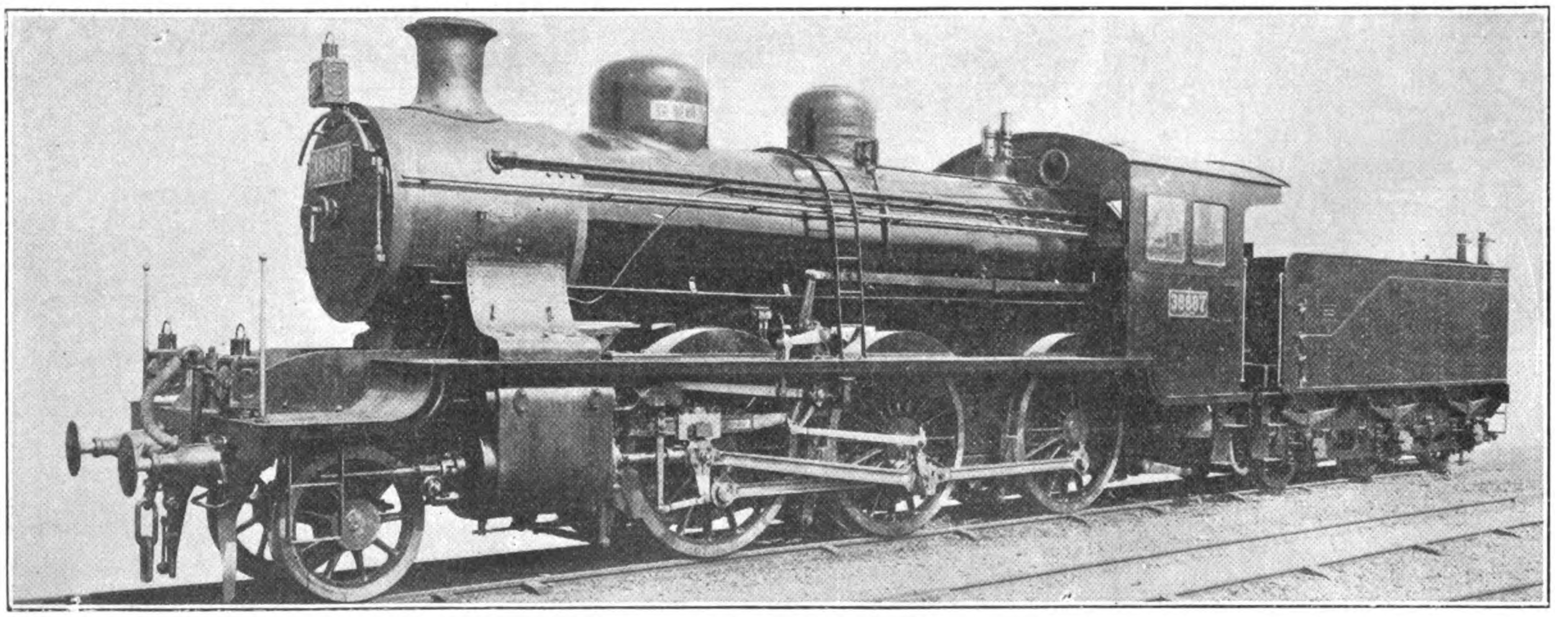
THE nationalization of Japan's railways gave a great impetus to the growth of locomotive and car building in that country and opened the way to a steady development of domestic plants which have now attained a high state of efficiency in the matter of production and workmanship. When the railways were nationalized, owing to the imperfect development of the domestic industries, Japan depended solely upon foreign makers for locomotives, as only the manufacture and repair of cars were undertaken at the railway shops. Under the new program the policy of supporting domestic industry has been consistently pursued and it was not long before the native car and locomotive builders attained greater efficiency in workmanship and capacity. By 1913, all orders for new equipment could be placed with the domestic plants, and the government railway shops were devoted almost exclusively to the repair of equipment and the manufacture of certain special cars. This policy has been religiously adhered to, for we find in the last annual report of the department of railways that the government workshops built only 6 new locomotives, 4 passenger coaches, 9 electric tramcars and 244 freight cars for the year ending March 31, 1918. This throws upon the private rolling stock manufacturers the task of keeping the home railways supplied with new material, a protective policy which has largely contributed to the prosperity and expansion of home industry. Hundreds of new and powerful locomotives have been designed by Japanese engineers and built at Japanese shops. The industry is no longer in the experimental stage but so firmly established that Japanese manufacturers are well qualified to take the place of their foreign compeers in filling home requirements, and in some instances they have met the wants of other railways in the Far East. From now on, foreign manufacturers must reckon more and more with the possibilities of Japanese competition in Asiatic markets, especially in China. Under the terms of the consortium, railway materials will be purchased at public tender from the manufacturers of the various lending nations, which opens the door to Japan for an equal footing in this respect, an advantage that her manufacturers will undoubtedly seek to make the most of. Not only in locomotives, but in cars, Japanese shops have established a high record in their own country, while the work of the South Manchuria Railway Shops at Shakoku in turning out standard guage cars and locomotives for the Manchurian and Korean systems is, according to foreign engineers who have investigated and reported on their efficiency,



Railway Shops of the Hyogo Works of the Kawasaki Dockyard Company







Types of Passenger and Freight Locomotives Built for the Imperial Government Railways of Japan at the Hyogo Works of the Kawasaki Dockyard Company

Of 3,122 locomotives in use in March, 1920, 983, or over 31 per cent., were constructed in Japan either at the Kawasaki Dockyard or by the Osaka Railway Car Co. Of the remainder, Great Britain built 28 per cent. and the United States 31 per cent.

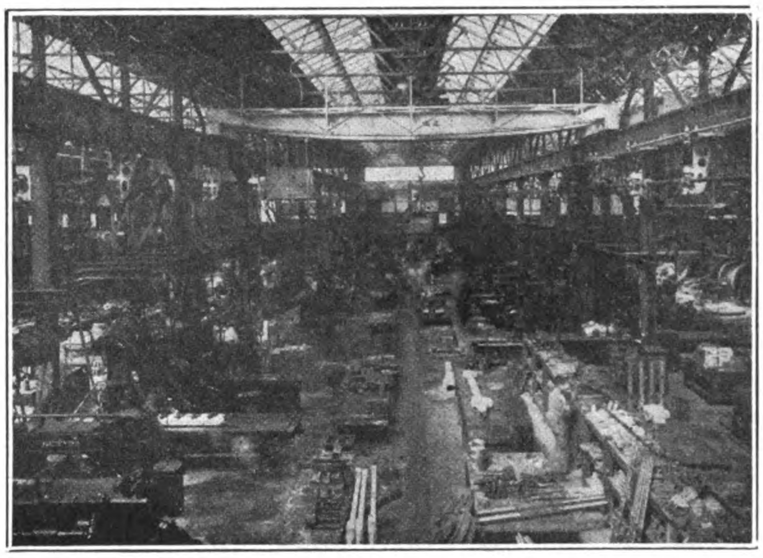
of the highest workmanship. In the March, 1921, number of THE FAR EASTERN REVIEW was published a detailed description of Japanese Locomotive and Car Practice and Specifications.

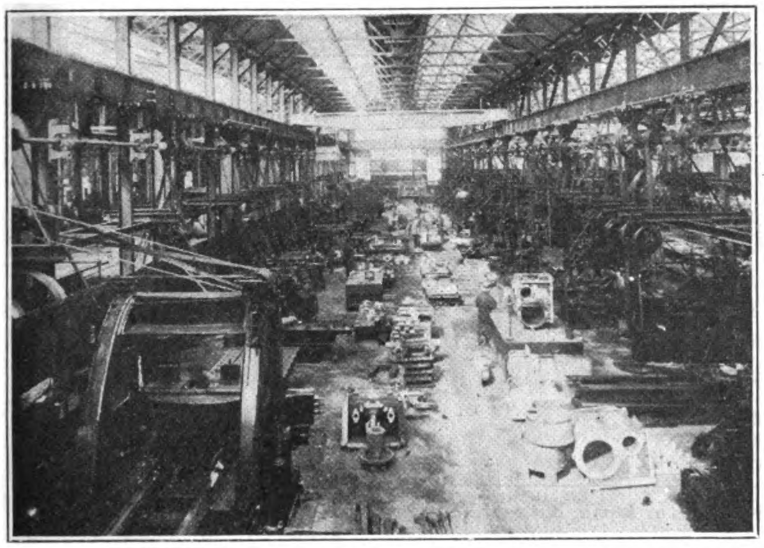
There are several large private Japanese plants who have specialized in locomotive and car building, amongst which may be mentioned the Kawasaki Dockyard Company of Kobe, the Kisha Seizo Kabushiki Kaisha (Locomotive Manufacturing Company) of Osaka, the Nihon Sharyo Seizo Kabushiki Kaisha (Japan Rolling Stock Manufacturing Company) of Nagoya, The Fujinagata Dockyard, the Umebachi Engineering Works, the Kasado Dockyard and others. The slump in shipbuilding which threatened to ruin many of the smaller yards in Japan has been the cause of turning their attention to other outlets for their activities and several are now specializing in railway materials.

Seizo Kaisha with 120 and the Nagoya Works of the same company with 300. These cars are all of a total length of 55-ft. 6-in. by 9-ft. 2-in. in width.

Freight cars are turned out by the Tokyo Works of the Kisha Seizo K. K. having an annual capacity of 1,700 cars, the Nagoya Works of the Nihon Sharyo K. K. with an output of 2,400, the Tokyo Works of the same company with 1,200, and the Hyogo Works of the Kawasaki Dockyard with 1,200 cars. The above figures show a total annual output of the private Japanese works of 305 locomotives, 820 passenger cars and 6,500 freight wagons.

If we add to the locomotive figures the capacity of the Shakoku Works of the South Manchuria Railway, the annual output of Japanese plants, exclusive of the several government shops, would be approximately 350 locomotives. The number of locomo-





Interior Views of the Osaka Locomotive and Car Works of the Kisha Seizo Kaisha, Limited

The most important of the private Japanese builders of locomotives is the Kawasaki Dockyard Company whose Hyogo Works are almost entirely devoted to this industry, with the Osaka Works of the Kisha Seizo Kabushiki Kaisha, a close second. The Kasado Dockyard Company comes third. The annual locomotive output of these works is as follows: Kawasaki Dockyard Co., Hyogo Works, 150 locomotives, Kisha Seizo Kabushiki Kaisha, Osaka Works, 120 locomotives and the Kasado Dockyard Company, 35. Most of these locomotives are of the 70-ton type with tenders of 50 tons.

Car manufacturers are more numerous, and we have the Hyogo Works of the Kawasaki Dockyard with an annual capacity of 150 passenger cars, the Tokyo Works of the Kisha Seizo Kabushiki Kaisha with 250, the Tokyo Works of the Nihon Sharyo

tives operating on the government railways in the year 1913-14 was 2,500, while at the end of the fiscal year 1919-20, this had increased to 3,121, a total of 621 locomotives in six years or an average demand for about 100 new locomotives a year. This would indicate that the home industry is well able to take care of the present national requirements, and as time goes on, other markets will have to be found for the output of these private plants, if they are to continue to operate at a profit.

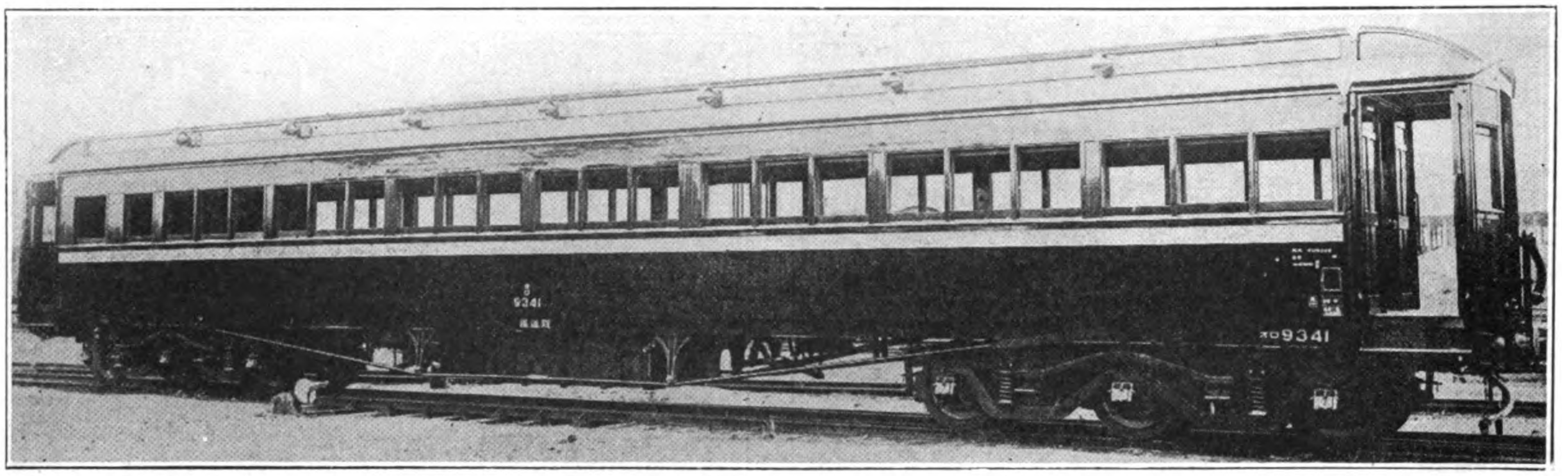
The actual number of locomotives furnished the government railways by private builders for the year 1919, was 187, and for 1920, 170. The following is an official resume of the number of locomotives and cars purchased by the government railways from private manufacturers during the years 1919-20:

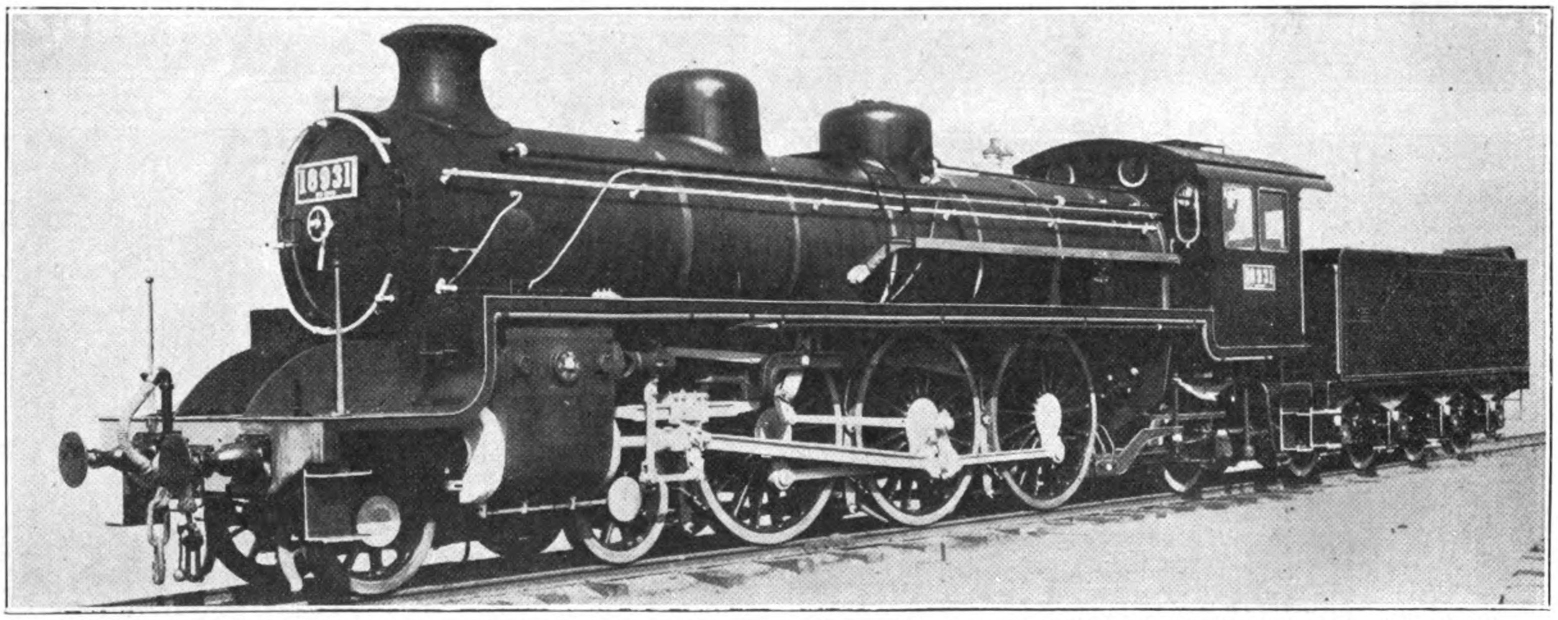
Locomotives and Tenders

Fiscal Year	Builders	Type 2-6-0	Type 2-8-0	Type 4-6-2	Total No
1919	Kawasaki Dockyard Co. ...	—	111	—	111
1919	Kisha Seizo K. K.	61	15	—	76
1919	Kasado Dockyard Co.... ...	—	—	—	—
	Total No. Built ...	61	126	—	187
1920	Kawasaki Dockyard Co. ...	26	73	—	99
1920	Kisha Seizo K. K.	47	—	12	59
1920	Kasado Dockyard Co.... ...	12	—	—	12
	Total No. Built ...	85	73	12	170

The Kisha Seizo Kabushiki, Kaisha

Typical of the development of the rolling stock industry in Japan is the growth of the Kisha Seizo Kabushiki Kaisha, one of the first private enterprises to enter the field in competition with foreign manufacturers for the supply of the domestic railway requirements. This company was organized in 1896 after the termination of the Sino-Japanese war, at a time when there was a boom in new railway construction. Like many other important Japanese enterprises, it had as promoters and sponsors some of the most powerful and far-sighted leaders of Japan who foresaw the necessity of building up the national industries in order to become independent of foreign manufacturers. The leading spirit in the organization of the company was the late Viscount Masuru Inouye, founder of Japan's railways and for many years chief of the railway bureau. He had as enthusiastic co-workers the late Marquis Kaoru Inouye, Baron Yanosuke Iwasaki, Viscount Shibusawa, Marquis Mori, Marquis Mayeda, Baron K. Sumitomo, Baron Denzaburi Fujita and several other influential business men, thus ensuring success from the start.





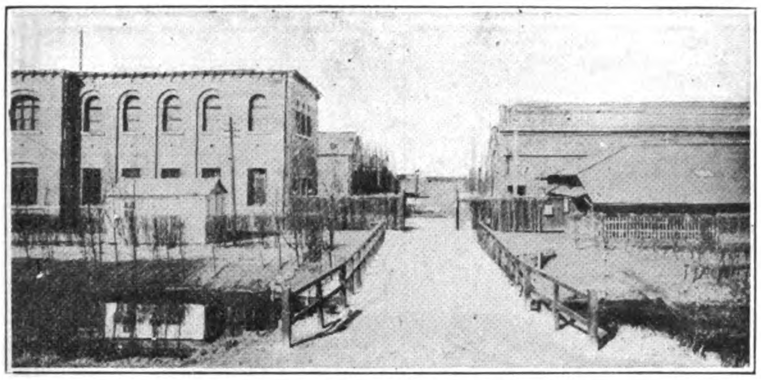
Types of Passenger Locomotive and Coach for the Imperial Government Railways of Japan, built at the Osaka Works of the Kiska Scizo Kaisha

Passenger Cars and Wagons

Fiscal Year	Builders	Passenger Cars	Wagons
1919	Kisha Seizo K. K.	94	810
1919	Amano Works	53	772
1919	Nihon Sharyo S. K. K. ...	121	1,278
1919	Kawasaki Dockyard Co. ...	77	—
	Total No. Built ...	345	2,860
1920	Kisha Seizo K. K.	93	537
1920	Amano Works	68	357
1920	Nihon Sharyo S. K. K. ...	130	638
1920	Kawasaki Dockyard Co. ...	103	—
	Total No. Built ...	349	1,532

In September, 1897, the enterprise was converted into a limited partnership with a capital of Y.640,000, and strongly supported by such powerful capitalists as Sumitomo, Fujita, Okura, Takata, Morimura, Imamura and the late Matsumoto, as well as the feudal lords of Moori, Mayeda and Hachisuga. The main office and works were located at Osaka, in their present site in Shimaya-machi, Nishi-ku, at that time in the open country on the right bank of the lower Ajikawa River and within a stone's throw of the Ajikawa station of the Nishinari railway line whose

tracks extend into all the yards of the works. Further transportation facilities were secured by the construction of a dock to the south of the factory, thus permitting receipt and dispatch of raw materials and the finished products direct to ocean and coastwise



Osaka Works of the Kisha Seizo Kaisha

steamers. At the same time the company acquired the Hiraoka Iron Works situated in Kinshi-bori, Honjo-ku, in Tokyo, which were converted into their Tokyo branch works and offices.

As the result of indefatigable efforts on the part of its directors (then presided over by Viscount Masaru Inouye, with Mr. Hiroshi Hiraoka as vice-president and Mr. Shogo Hasegawa as manager) the company was well equipped to reap the advantages of the railway boom that took place on the termination of the Russo-Japanese war in 1905. In October, 1912, the enterprise was again reorganized into a joint stock company and the capital increased to Y. 2,700,000, all of which is paid up with the exception of Y. 487,650. The financial position of the company provides a striking tribute to the skilful management of the late Viscount Inouye and the present manager, Mr. Shogo Hasegawa, during all these years, as it now has a reserve fund of Y. 3,204,468 with bonds outstanding to the extent of only Y. 300,000. While the majority of Japanese industrial concerns have passed through their alternating periods of prosperity and adversity, the Kisha Seizo Kaisha has not experienced since its organization a single set-back, but has progressed slowly and steadily to its present high state of prosperity and efficiency.

The company has been exceptionally fortunate in having the invaluable counsel and aid of Viscount Shibusawa and Baron Mori, and the services of the most expert engineers under the direction of Mr. Shogo Hasegawa, one of the foremost engineers of Japan. The policy of the company has been one of seeking constant improvement, efficiency and, above all, financial and business stability. To this end distribution of profits to the shareholders has been kept down to a reasonable dividend in order to pay off debentures and build up a large reserve for expansion and betterments. The result is seen in the handsome reserve fund, which enables the company to do business far in excess of its capital without recourse to the banks for accommodation. In these days of business depression in Japan, with many war concerns going on the rocks and others curtailing their activities, the shareholders of the Kisha Seizo Kaisha have just reason to be proud of the management which enables them to weather the storm.

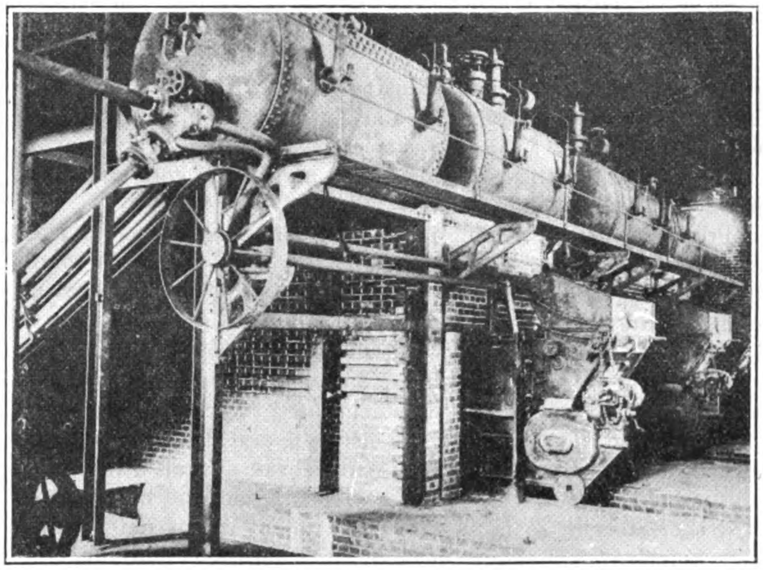
Since its organization, the company has specialized in the manufacture of locomotives. Foreign engineers who have inspected the works and its products frankly state that these not only compare favorably with locomotives made in Europe and America, but in some particulars they possess distinct advantages. Many of the finest and most powerful engines in operation on the imperial government railways have been turned out at the Osaka Works of this company. In addition, passenger and freight cars of all types and sizes are manufactured for the domestic narrow gauge railways and electric tramways, while standard gauge cars have been built for the Korean and Manchurian lines. The shops are equipped to make cars for any gauge of line.

The powerful locomotives built by the Osaka Works employed on the Abt railway over the Usui pass of the Shin-Yetsu line of the government railways, have called forth unstinted praise and admiration from engineering circles. Bridges and structural steel buildings are also built by the Osaka Works. The magnificient long railway bridge over the Dakusuikei River in central Formosa turned out by the works stands as one of the highest testimonials to their efficiency in this line. The works also specialize in the manufacture of certain machine tools, and in the Takuma patent water tube boiler, the patent rights for which were acquired last year from the Takuma Boiler Manufacturing Company. Many improvements have been made which reduces fuel consumption and increases their efficiency, and the works are now busy on many orders for these boilers from industrial plants in Japan.

The head office and works of the company are located at Shimaya-machi,Nishi-ku, Osaka. The buildings cover an area of about 38,400 square yards, with a total ground area of approximately 120,000 square yards. They are equipped with 860 machines, have a total horse power of 2,514, and employ 1,800 workers.

The branch office and works are located at Kinshi-cho, Honju-ku, Tokyo. The buildings cover an area of approximately 28,000 square yards with a total ground area of about 53,000 square yards. They are equipped with 200 machines with a horse-power of 600, and employ 800 workers.

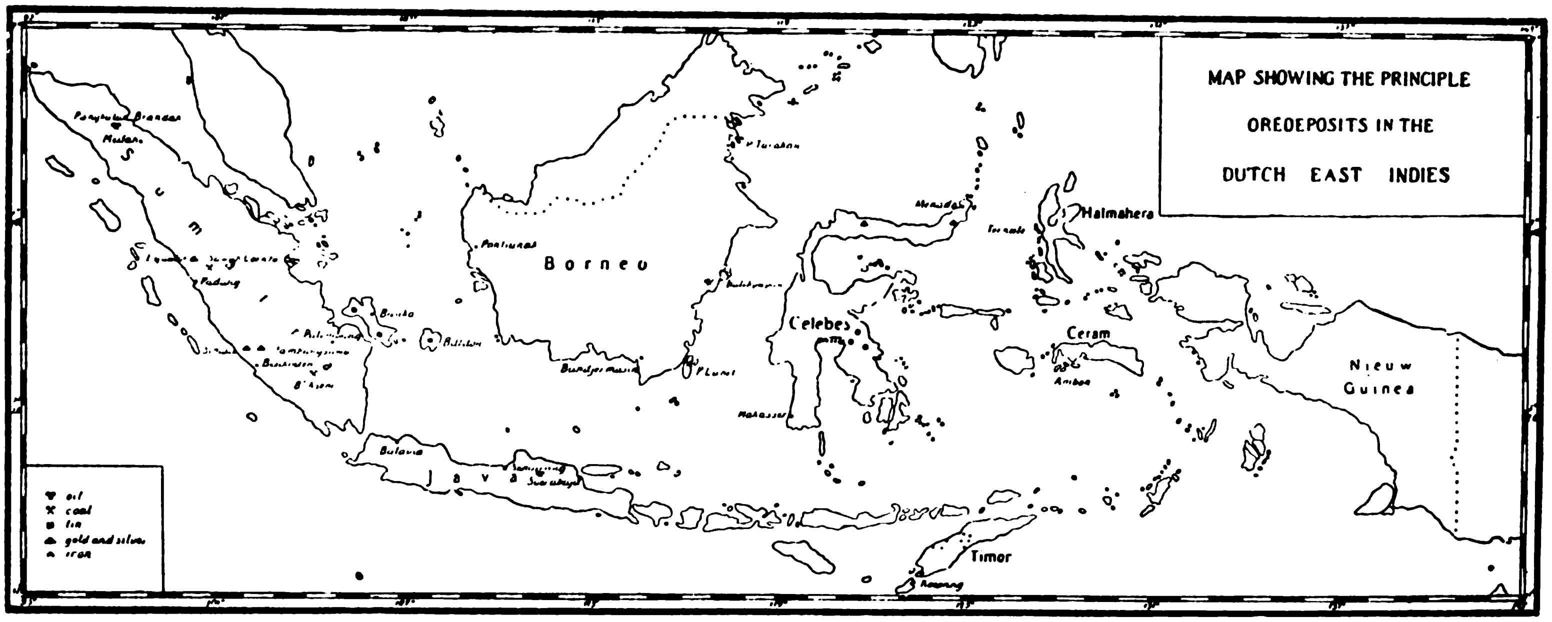
The annual manufacturing capacity of the Osaka Works is 120 locomotives, 1,500 steel freight cars, 8,000 tons of bridge beams, 250 various machine tools and about 10,000 h.p. of the Takuma water tube boilers. The capacity of the Tokyo Works is 250 bogie passenger coaches, 2,500 freight cars and 1,000 switch stands. In addition to the Honju works at Tokyo, the company operates another branch works in Tokyo at Higashi Hirai-machi, in Fukagawa-ku.



Battery of Takuma Patent Water Tube Boilers with Automatic Stokers manufactured at the Kisha Seizo Kaisha, Osaka Works

The directors of the company are, Mr. Shigeji Imamura, Mr. Haruo Kuzuno, Mr. Kikichiro Okura and Mr. Sadakichi Tanabe, with Mr. Masao Shibusawa and Mr. Kikuo Aoki as auditors and Mr. Hiroshi Hiraoka as advisor. Mr. Shogo Hasegawa, doctor of engineering, acts as managing director. The Osaka head offices are under the management of Mr. Masasuke Izuna, and the Tokyo offices under Mr. Unjiro Saito.

Mining in the Netherlands East Indies



As can be seen at a glance the greater part of the ore deposits in the Indies are situated in the Outer Possessions. Indeed, though Java may be considered a rich country from an agricultural point of view, the other islands are exceedingly rich as to mineral wealth

THE government mine service includes various activities, *i.e.*, geological surveying, prospecting for useful minerals, carrying on researches of mineralogical and metallurgical nature, locating and sinking wells for drinking water in deep layers, organizing and managing state mining industries and exercizing regular legal supervision over private mining enterprises.

The results of the various operations are published in the year-book of the service. The first part is devoted to administrative, technical and statistical data, the second part to scientific essays.

The government mining industry includes the working of the collieries at Sawah Loentoh, at Tandjong (Sumatra), and at Poeloe Laoet, an island off the south-east coast of Borneo, the working of the tin mines on the island of Banka and of the gold and silver mines in Benkoolen (Sumatra).

Private parties wishing to exploit minerals must obtain a license to prospect and a concession, both subject to certain conditions regarding nationality, duration of the work, government taxes, security, transfer and government supervision, set forth in the Mining Act of 1899, which was revised in 1910 and again in 1919.

According to this latest revision, aside from rights already granted, no more concessions will be granted to private individuals for the so-called: (*b*) minerals (*i.e.*, anthracite and all kinds of mineral and brown-coal, petroleum, asphalt, earthwax and all other kinds of bituminous substances, solid as well as liquid and inflammable gases, the latter in so far as they are not of recent date (marsh gases), among which, also, iodine and allied substances are ranged.

The minerals named may henceforth be exploited only by the state itself, or by private parties according to an exploitation contract to be signed with the government on the basis of Article 54 of the Indian Mining Act (State Gazette 1910 No. 588), which agreement may only be signed by power of attorney fixed by law.

Concessions for the remaining minerals are still granted on on the old basis. The working of minerals not mentioned in the Mining Act is also bound by a permit.

Connected with the head office of the mining service in Batavia is the mineralogical and geological museum of the East Indian Archipelago, to which anyone interested in the work may obtain admission on application.

Tin-Mining by the Government

The government tin mines, all of which are situated on the island of Banka, are the outcome of an agreement made for the supply of tin by the old East India Company with the Rajahs of Palembang, who in those days owned the island.

The mining which probably dates from 1710, was at first carried on by the Malay population. Soon, however, the Chinese took the industry in hand, in 1820 it was placed under European control by the Dutch East Indian government and since 1852 has been supervised by mining engineers trained in Europe. Originally these engineers were entrusted only with the topographical, geological and mineralogical survey of the island, but they have since been put in charge of the actual mining and smelting operations. They have introduced important improvements in the construction of smelting furnaces, the drainage of the open pits and the stripping of the overburden, so that the tin industry at Banka is now entirely up to date and making use of the latest technical inventions. Moreover, during the past few years the tin has been subjected to chemical test, before exported, so that the Banka stamp guarantees the quality of the product.

The island has an area of 12.240 square kilometers and extends over a length of 100 nautical miles. Most of the mines are situated on the north-east side of the island.

The ore is worked almost exclusively in open pits, which are found in the alluvial deposits of many riverbeds and in the alluvial strata on the slopes of small hills. Tin mining, therefore, cannot be regarded in the same sense as mining, which is usually considered as subterranean industry.

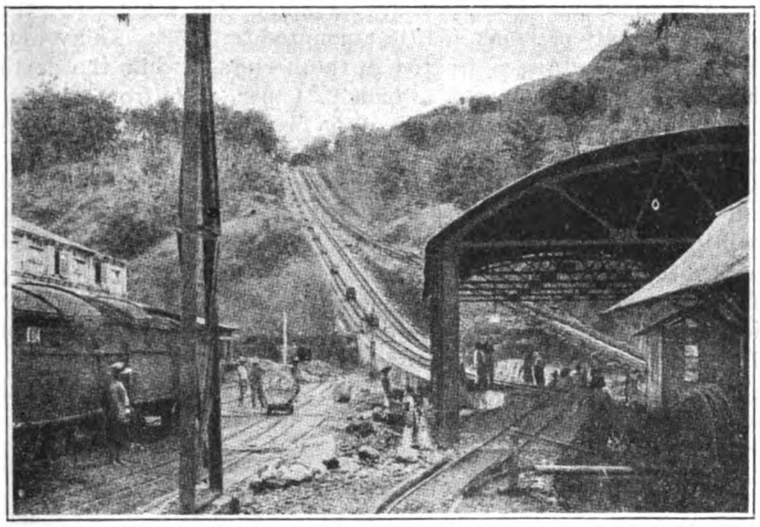
The strata from which the ore is obtained are from 0.1-0.4 m. in thickness, although in exoeptional cases they are several metres.

The ore is first cleaned in washditches and is then generally smelted by each mine in its own smelting house by means of simple blast furnaces. In some districts there is a central smelting house for all the mines. It is planned to establish one central smelting furnace for all Banka.

The work is still done by Chinese coolies and is partly contracted for and partly carried out under the government's own management.

In the latter case the usual manual labor is made use of as well as machinery. In the year of report, 1918, 6.94 per cent. of the total production of tin was obtained under government supervision.

The average number of laborers (contract coolies) in the year of report, 1918, amounted to 18.658. Of the 13.330 laborers who had completed their contracts, about 15 per cent. returned to their own country.



Inclined Cable Track at entrance of the Sawah Loento Screening House

Those sent back are accompanied by an official and a doctor.

In the above year the condition of health among the coolies was good. About 3.07 per cent. were treated in the hospitals. Owing to the nature of the work, sickness was chiefly due to malaria and skin disease.

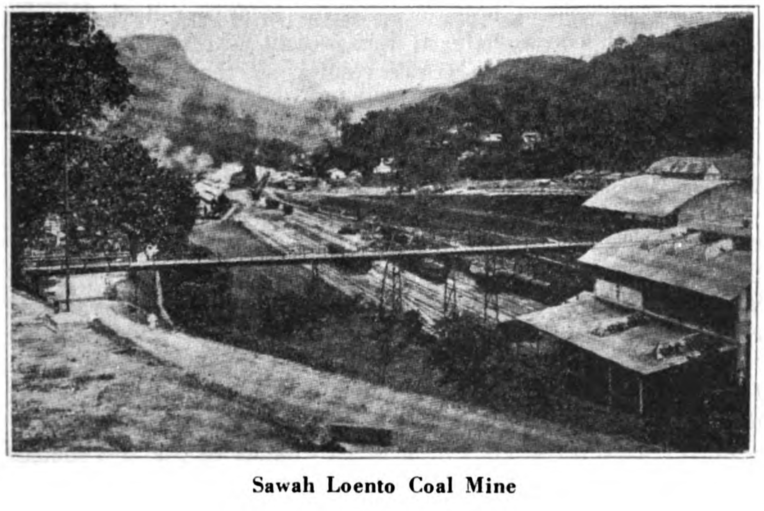
The death rate amounted to 3.04 per cent., but 1.66 per cent. of this was due to influenza.

Very good results have been obtained by providing the coolies with unpolished rice by which berri-berri, a disease very prevalent in former years, is being gradually wiped out.

At the present time there are nine hospitals.

Since 1914 Banka tin has been sold almost exclusively in the Dutch East-Indies. The tin is sold underhand in Batavia, while a small part is supplied to various branches of service in Holland and the East-Indies.

In 1918 there were in Banka 325 tin mines, employing 18,638 laborers, producing 12,055 metric tons, of which 36 tons were auctioned in Holland.



Sawah Loento Coal Mine

Private Tin Mines

The chief private enterprise is that of the "Billiton Maatschappij" which works the tin in the island of Billiton.

In 1852 a concession was granted to the Billiton Maatschappij, and in 1892 was extended for a further period of thirty-five years. In the new agreement it is stipulated, that five-eighths of the yearly profits shall go to the government.

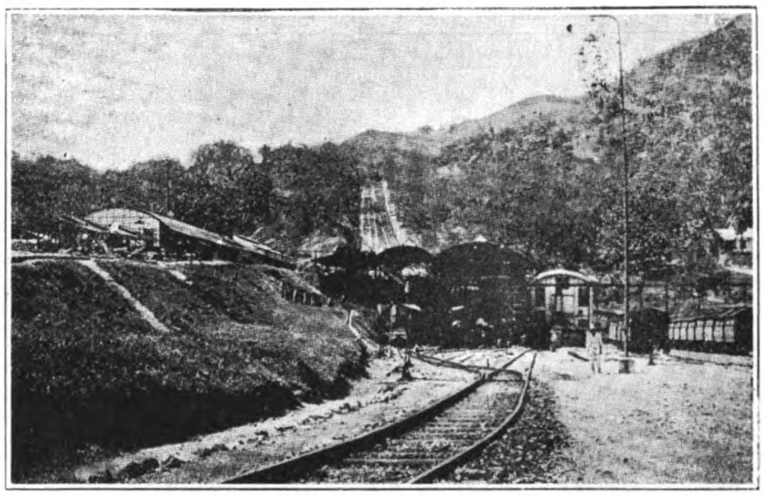
The geological formation and the occurrence of the ore are almost similar to those in Banka. In Billiton, however, there are also found veins of ore, which are rich enough to be worked.

As in Banka, the work is done by Chinese kongsies working under contract while the industry is organised along the same lines. In 1918 thirty mines were being worked.

Another private enterprise is the Singkep Tin Company, to which a concession was granted in 1889 on the island of that name in the Rhiau Archipelago.

The occurrence of the ore is similar to that in Banka and Billiton and the mines are worked according to almost the same system. In the hills are also found tunnel constructions.

Near Singkep tin ore is also found at the bottom of the sea, where it is worked by means of dredgers. The mud which is brought to the surface is put through a preliminary concentration on board and is then further worked on shore. The Singkep ore is smelted in Singapore.



Sawah Loento Coal Mine

In 1918 the production in tons was 6,945. The share in the profits paid by the Billiton Co. to the N.E.I. government was 5,689,538 guilders.

Coal

There are now three enterprises by the government: the Ombilin mines, the mine at Poeloe Laoet and the Boekit-Asem mines.

Ombilin Mines.—The Ombilin mines are situated near Sawah Loento in the Padang Highlands, a region very famous for its beautiful scenery. Mining was begun in 1892.

For transport a railway 156 kilometers in length was constructed. Owing to the mountainous nature of the country parts of the track are on the cogwheel system.

The coal field extends for 10 kilometers in length and has a breadth of 9 kilometers. The thickness of the seams varies, but is usually very great, some seams being as much as 23 metres.

The quantity of coal is estimated at ±200,000,000 metric tons, of which a total of 7,291,425 tons was extracted from 1892 to 1919.

The coal burns easily with a large, clear flame and only small quantities of ash and cinders.

The mines so far have been worked entirely by means of tunnel construction together with the use of all kinds of modern technical machinery.

Formerly the greater part of the production was sold to private buyers (in 1913 80 per cent., in 1914 76 per cent. of the total output), but during the war years, on account of the stagnation of foreign shipping, the government public services were supplied

in increasing measure; in 1916: 28 per cent., in 1917: 47.5 per cent., in 1918: 48.62 per cent.

The coal sold to private buyers is partly taken in at Emmahaven as bunker coal, partly shipped as freight coal to some place where it is sold as bunker coal. In 1918 it was shipped to Tandjong Priok, Sabang, Sourabaya and Macassar.

In order to provide for the need of coal which existed in the archipelago during the war years, production was run up as high as possible and as far as available means permitted.

The laborers are for a large part convicts undergoing penal servitude (natives and those holding the same rights, convicted for some crime).

At the end of 1918 their number amounted to 3,377, out of a total of 7,650 laborers.

On account of the continuous changing of these people, who must always be trained anew, the individual labor prestation of this class of laborers is naturally smaller than that of steady contract laborers and free working men. Favorable results are generally obtained by making contracts with released convicts who have a record for good conduct during their penal term.

The condition of health is generally more unfavorable among the convict laborers, since they are more susceptible to disease.

The island is favorably situated for the sale of the product, being in the direct route of the shipping lines between South Africa, Australia, Java, Macassar, China and Japan.

In 1918 162 ships called at Stagen.

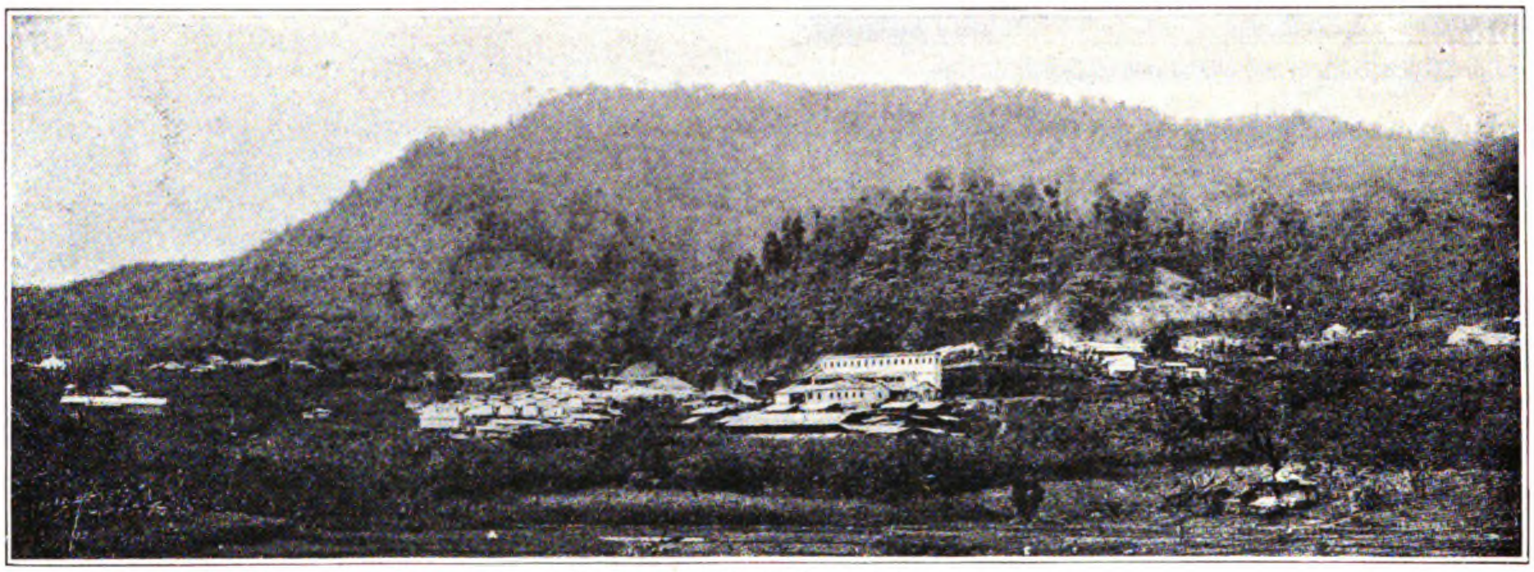
In the year of report 96,606 tons of coal were shipped, of which 25.4 per cent. was delivered to private parties and 74.6 per cent. to government services and industries.

The work is chiefly done by Javanese contract coolies, the average strength of which in 1918 amounted to 2,639. An average of 5.53 per cent. were treated in the hospitals, while the death rate was 2.50 per cent. of which 2.24 per cent. from disease. The high death rate is a result of the prevalence of influenza and cholera.

The production which, from 1907 to October, 1913, amounted to 902,295 tons, was in 1913 126,885 tons, in 1914 128,505 tons, in 1915 117,710 tons, in 1916 124,105 tons, in 1917 120,834 tons, and in 1918 121,421 tons.

Boekit Asem Collieries.—This third government coal mine is situated near the doesoen Tandjoeng, 12 kilometers south-west of Moeara Enim in the Residency of Palembang.

For a long time it was known by various explorers that coal was to be found in the highlands of this province.



View of the Mill of the Redjang Lebong Company

The mortality resulting from sickness amounted to 10 per cent. among the contract laborers and 17.5 per cent. among the convicts.

The death rate resulting from accidents amounted to a total of 2.65 per cent. in 1914, against 1.59 per cent. in 1917 and 0.74 per cent. in 1918.

In 1918 no work was carried on at the coal brick factory, since there was a sufficient demand for fine sifted coal.

Following are some figures relating to the government coal mining industry :--

In 1918 the production in tons was 504,201. The book value of the enterprise in guilders was 4,595,053. The receipts in guilders were 7,029,395. The working expenses in guilders 6,370,174. Net profits after deducting share paid to the Sumatra R.R. in guilders were 659,131.

Poeloe Laoet.—On the island of Poeloe Laoet, off the south-east coast of Borneo, a colliery has been worked by the government since October 1st, 1913.

The whole island is reserved by the government for the purposes of mining and geological research.

The centre of the mining industry is at Stagen, which is connected with the harbor of Stagen by a railway five kilometers long.

The mining is carried on in two strata.

The proposed extension of the mines could not be carried out immediately, because of war conditions.

Originally little attention was paid to this fact because the mineral was brown-coal. By the proximity of volcanic rock (andesiet), however, the coal is here and there improved.

In the geological research of 1915 it appeared that great quantities of this improved coal were present near Tandjoeng.

Stoking tests gave favorable results, so that in connection with the existing coal shortage in the Dutch East-Indies and also to supply the government railroads in their need of fuel, it was decided to work one mine on a small scale by way of experiment. The work was confined to day labor in the day-seams of the so-called Mangoes strata. The coal produced was transported from Tandjoeng to Moeara Enim on a tramway, constructed in a short time by the government railway service, and after being transloaded into the cars of the South Sumatra government railway, brought to Palembang (Kertapati).

The refined coal is found in three layers, the upper so-called *Mangoes* layer, consisting of two banks 6 and 7 metres in thickness intersected by a tuff layer from 4 to 5 metres thick, the middle so-called *Soeban* layer, consisting of two banks of 6 and 3 metres intersected by a stratum of clay 2 metres thick and the lower so-called *Petai* layer from 5 to 6 metres thick. The layers are mutually separated by marl-slate and sandstone 20 metres thick between the Mangoes and Soeban layers and 25 metres thick between the Soeban and Petai layers. A fourth layer also occurs, *i.e.*, the *Merapi* layer, at a depth of about 100 metres below the Petai layer.

The coal is very pure, containing not more than 3 per cent. of ashes, mostly 1-2 per cent. but some sorts show an inclination to become crushed. After an optional contract had been closed for the eventual taking over of the Lematang concessions situated in this region, these concessions and the adjacent grounds were investigated.

The result of this investigation was, that in the year 1919 the concession was taken over by the government.

The mining is principally limited to day labor in the Mangoes layer, the Soeban layer being worked for the first time in 1919. At present the coal is mined in three qualities: (1) a highly refined coal with about 8,000 calories heat value, (2) a coal less freed from gas and water and which therefore shows a greater solidity of from 6000 to 7000 calories, (3) a sort which is poorly refined and can not stand long storage of about 6200 calories.

The production amounted to 9764 tons in 1917 and in 1918 to 50,300 tons, while in 1919 more than 100,000 tons will be obtained.

Measures are now being taken for the construction of a colliery on a large scale.

Government Gold-Mining in Benkoolen

A mineralogical geological research instituted by the government proved the existence of two gold and silver deposits capable of being developed: Tambang Sawah and Lebong Simpang, both located in the division Lebong in the Residency of Benkoolen.

The Tambang Sawah deposit contains chiefly manganese-bearing silver ore, which will be worked according to a process discovered by the engineer Caron.

Because of war conditions the necessary test on a large scale could only be made in America, where they took place in the station for metallurgical research in Denver, with the co-operation and instruction of Professor Clevenger of the United States bureau of mines. The necessary machines were then ordered.

The delivery and erection of these installations are now being actively carried on.

During the time when the tests were being made, preliminary measures were already being taken on the location, while a road connecting the mine with the principal town of Moeara Aman was built by the service of the state public works.

By the service of waterpower and electricity an electric waterpower station was built at Tais to supply the mine with current. This powerhouse also has accommodation for supplying more power to the Redjang Lebong mine.

The machinery necessary for working the ore at Lebong Simpang is now being installed. The power will be supplied by a small waterpower station.

Private Gold-Mining. Other Minerals

From ancient times the East Indian islands have had the reputation of being rich in gold, Java included, though this is the only island where no gold mines are found, the metal being discovered only sporadically.

At the end of the last century private enterprise led to the discovery of a number of places where gold existed, the result of which was that several companies were formed for exploration and a few concessions, which did not turn out to be very profitable. The record of these companies on the whole has been unfavorable, but gradually sounder conditions have arisen.

Gold is found in Sumatra, Borneo and Celebes in all kinds of deposits, such as beach and alluvial deposits, tertiary gravel beds and as vein deposits.

By the end of 1918 54 concessions had been granted for the mining of gold and silver.

The mining of the gravel beds so far has been of small importance and the dredging companies, also have met with little success. Natives are employed in the washing of river sediment.

The more important mining companies confine themselves exclusively to the working of vein deposits.

The greatest quantity of gold is produced in the province of Benkoolen in Sumatra, where two mines are at present in working. The province West Coast of Sumatra, on the other hand, produces by far the most silver.

The mining area, known by the name of the Lebong district (Lebong mine), lies about 75 kilometers north of the capital and harbor of Benkoolen.

The veins sometimes extend as far as 4 kilometers. Waterpower is everywhere available for the working of the ore.

Another gold-mining district is to be found in the northern peninsula of Celebes, which, however, so far has failed to live up to expectations. At the present time there are three mines in working.

A third gold centre is located in Central Sumatra near Padang, where the mines have been producing since 1913.

Silver mining in the archipelago is not an independent industry, being taken from the ore together with gold. The mines worked on the West Coast of Sumatra produce chiefly silver.

Among the other minerals found in the Dutch East-Indies, besides petroleum, mention must also be made of iodine, wolframite, manganese ore, sulphur and copper ore, and also diamonds in Borneo.

These mines are worked exclusively by private enterprise. Various springs in East Java produce iodine, which is shipped to Europe in the form of copper iodied. In 1915 the production amounted to 50.5 tons of 1000 kilograms, in 1916 to 33 tons and in 1917 to 15.4 tons.

Wolframite, manganese and sulphur are obtained in small quantities. The amounts of sulphur produced in 1911, 1912, 1913 and 1914, respectively, were 875, 305, 1.236 and 300 tons (1000 kilograms), while in the years 1915 up to and including 1918 only a very small amount was obtained.

Marble quarries are found in Java, from which the stone is worked into tiles, among other things. In 1918 the production amounted to 5,500 square metres.

There are also a number of lime kilns and manufacturies for building materials. Near Padang a Portland cement factory has been established since 1911. In 1913 178,043 barrels of cement were produced, in 1914 213,483, in 1915 196,171, in 1916 229,923 and in 1917 204,264, which found a ready market. The factory has been enlarged with a second installation.

The results of the diamond digging in the archipelago suffered under war conditions in the second part of 1914. The greatest number of diamonds is found in the district of Martapoera in the South and East Division of Borneo.

The number of licences granted for diamond digging amounted in 1918 to 13,000 against 6,956 in 1917, 9,000 in 1916, 5,623 in 1915, 2,379 in 1914, 8,120 in 1913 and 6,049 in 1912.

Gold and Silver Production in Netherlands India in Kilograms.

	Gold kg.	Value in Glds.*	Silver kg.	Value in Glds.	Value of diamond production in Glds.
1910	4.847	7.935.913	15.977	666.952	—
1911	4.236	7.505.381	15.831	684.027	47.627
1912	4.002	6.594.120	14.258	697.125	52.518
1913	3.865	6.369.198	17.212	827.176	66.807
1914	3.503	5.772.941	32.555	1.434.229	48.762
1915	4.052	6.671.167	41.653	1.661.959	50.958
1916	3.814	6.285.631	37.516	1.980.967	77.613
1917	3.893	6.415.257	34.014	2.225.920	51.300
1918	2.971 †	4.896.906	28.626 †	2.220.206	116.360

* In calculating the value the gold value is taken at *f* 1648.00 per kg., while the silver value is calculated at the average market price in New York, which amounted in 1914 to $0.5481, in 1915 to $0.49684, in 1916 to $0.6566, in 1917 to $0.81417 and in 1918 to $0.96772 per ounce or respectively to *f* 44.055, *f* 39.90, *f* 52.77, *f* 65.44 and *f* 78.12 per kg.

† Preliminary figure.

Coal Production in the Netherlands East Indies

OMBILIN-COAL MINES (*W. Sumatra*)

1919	Production in tons	Export Government	Export Others	Delivered in bunker steamers at Emmahaven Government	Delivered in bunker steamers at Emmahaven Others
January	38067	26956	7530	147	8668
February	33927	14790	900	287	8723
March	39674	14237	10150	210	13076
April	40667	14237	10150	210	13076
May	30214	18890	2040	96	13049
June	38702	20905	5070	134	9139
July	43093	8458	8310	168	9187
August	46572	8440	8722	131	12003
September	41780	17405	5570	147	10657
October	43708	23556	16830	445	13138
November	43208	17942	8865	315	9756
December	43266	21405	2915	72	5867
1920					
January	45090	13290	8659	161	11187
February	42361	10347	7500	357	11851
March	47553	27625	1170	88	12270
April	42372	17381	13455	162	11826
May	46550	8065	681	84	13646
June	47750	19828	4800	84	9577
July	51658	16068	13668	278	12484
August	49399	16524	2107	255	11481
September	49090	24205	9147	91	18108
October	50540	22014	4415	73	4915
November	45747	25537	2004	263	12583
December	49035	23130	1510	161	13592

PULU LAUT COAL MINES (*S. E. Borneo*)

Preliminary Production Figures
1919-1920

	Quantities in 1000 Kgs. 1919	1920
1st Quarter	40.805	43.717
2nd ,, ...	46.775	45.463
3rd ,, ...	46.568	49 106
4th ,, ...	46.010	50.486
Year's Total	180.158	188.772

BUKIT-ASAM COAL MINES (*S. E. Sumatra*)

	Quantities in 1000 Kgs. 1919	1920
1st Quarter	18.290	27.662
2nd ,, ...	27.774	36.434
3rd ,, ...	30.185	36.946
4th ,, ...	29.684	37.225
Year's total	105.933	138.267

BANKA TIN MINES

Preliminary Production Figures
1919-1920

	Quantities in piculs. 1919	1920
1st Quarter	56.167	62.487
2nd ,, ...	31.199	38.654
3rd ,, ...	48.580	58.234
4th ,, ...	59.449	69.738
Year's total	195.395	229.113

Manchuria and Seattle

SEATTLE, June 2.—Equipment for the South Manchurian Railway, valued at $125,000,000, will be exported through Seattle during the next four years, according to Yozo Tamura, American representative of the railway, who passed through Seattle recently. This promise of a vast volume of shipping for this port, coupled with the statement of Tamura that new mining equipment for the railway's mines will in the future be bought in the United States instead of Great Britain as at present, is greeted by shipping men as an indicator of a wave of trade that will sweep down on the port of Seattle and establish it in premier position on the Pacific Coast.

Another word of optimism was given by the Japanese railway man, when he said that in Manchuria, Seattle is by far the best known American city. Tamura also said his company is also working on a suggested plan that may involve in the future the shipping to Seattle of vast amounts of coal and iron from the mines of Manchuria. Tamura was in Seattle with a party of six American geologists and mining experts who are on their way to survey the holdings of the company. Before proceeding with extensive development plans the company wants to definitely establish the amount of wealth buried under the hills of Manchuria near Fushun and Laoyang. After a survey of the coal and iron ore deposits of the company, the party will return to this country in September. Tamura indicated that the vast development plans of the company would then proceed and the equipment in itself no small plum, would start moving through this port. The party will go from Dairen to Fushun. The output of the colliery is now 10,000 tons of coal daily. We hope, as a result of our investigations, to be able to increase this in a very short time to 20,000 tons daily. Following the inspection of the coal deposits the party will go to Liaoyang, which lies to the south of Fushun. There is located at this place an enormous deposit of low grade iron ore which has been estimated at 500,000,000 tons, available.

Prices Collapse in the Far East

Discussing the trade collapse in India, the Chartered Bank of India, Australia and China, Sir Montague C. Turner, presiding at the annual meeting in London, gave an impressive list of the depreciation in values between March 1, 1920, and the same date this year. The list is as follows :

	1920	1921	Per Cent. Dec.
Cotton, per lb.	29.90d.	6.38d.	78
Jute, per ton	£ 70	£32	54
Hemp, per ton	76	40	47
Copra	72	32	55
Linseed	66-10	18	68
Rapeseed	51	15-5	71
Rubber (cr.), lb.	2s. 7d.	1s. 1d.	50
Rubber (Para)	2s. 7¼d.	11½d.	62
Tin, per ton	£409-10	£159-10	61
Silk, per lb..	64s.	20 3d.	67
Shellac, per cwt.	825s.	300s.	63

He added that silver had fallen from 84d. per oz. to 32½d., or 61 per cent., and eastern exchanges as follows :

Place—	Mar 1, 1920	Mar. 1, 1921	P. C.
Calcutta	...2s. 7d.	1s. 3½d.	50
Hongkong	...5s. 7d.	2s. 4¾d.	57
Shanghai	...8s. 7d.	3s. 2d.	63
Saigon	...6s. 4d.	2s. 3½d.	63
Manila	...2s. 10d.	2s. 2½d.	22

Irrigation in the Philippines

IN the latest report of the irrigation division of the bureau of public works, of which Mr. A. D. Williams is the chief engineer, it was pointed out that the absence of many of the engineers of the division in the military service had hampered greatly the activities of the division. The lack of technical personnel, together with high prices and the difficulty in obtaining materials during the first part of the present year continued to delay an active program for the construction of irrigation and waterworks projects. These conditions improved during the latter part of the year and permitted the division to substantially increase its activities.

Hydrographic Investigations

The hydrographic investigations which were resumed in 1918 were extended during the year to include most of the important streams for irrigation and power purposes on Luzon and in the Visayan Islands. A number of gaging stations were also established in the provinces of Cotabato and Lanao, Mindanao. There were a total of 108 permanent gaging stations in 23 provinces being maintained at the end of the year at which gagings were regularly made by hydrographers of the division. In addition to the operation of these stations miscellaneous gagings were made of 23 streams in connection with applications for water rights and the determination of old rights. Complete records, including data collected by the old irrigation division during 1908 to 1912, are now available for 28 gaging stations covering periods of from one to four years. In order that these records and other hydrographic data on hand be made more readily available for use in irrigation and power development by private parties it is recommended that they be compiled and published in bulletin form as is done in the United States and Hawaiian Islands.

Topographic Surveys

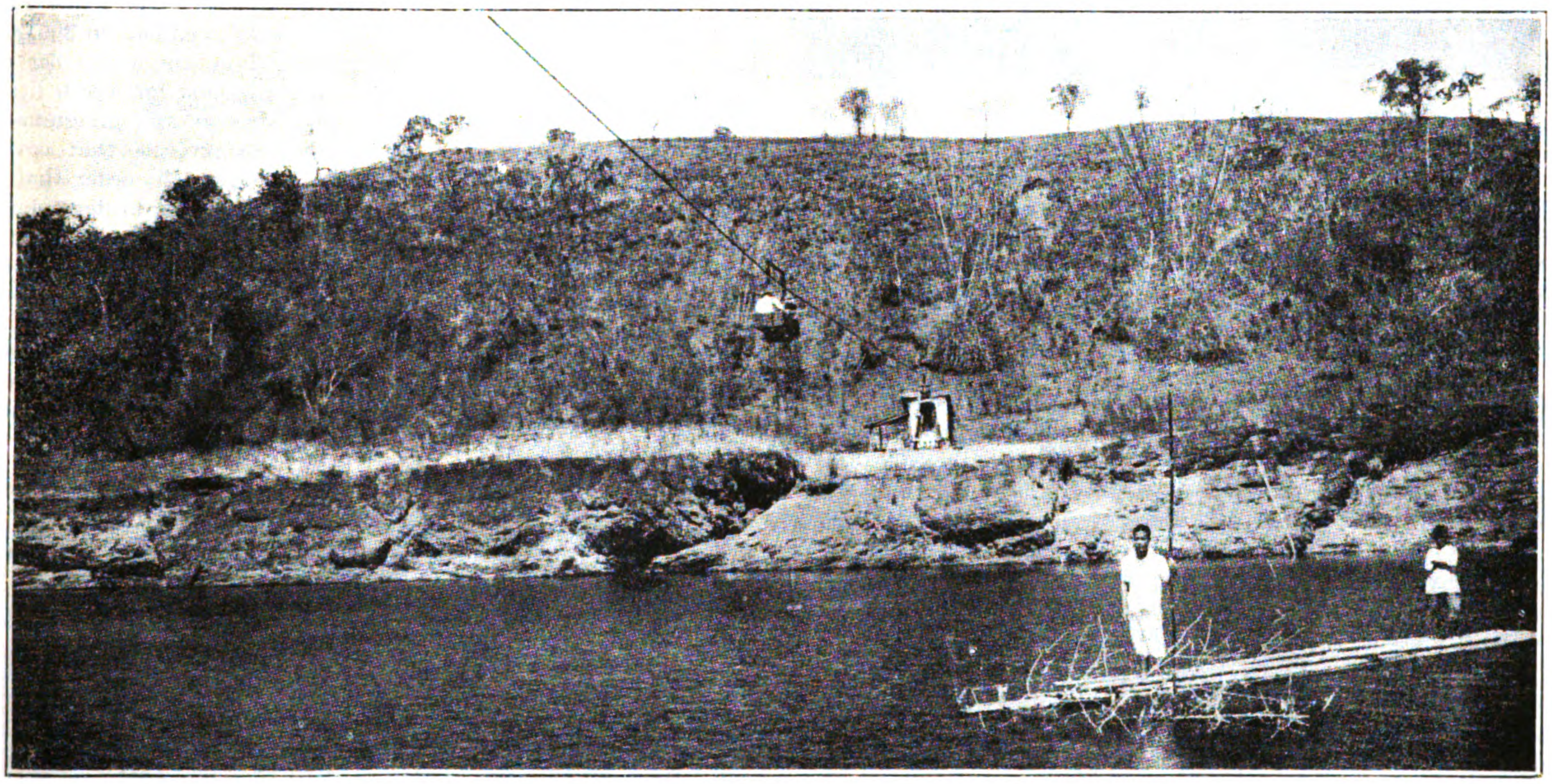
During the year topographic surveys were completed of the following irrigation projects covering a total area of approximately 50,000 hectares :—

Naic Irrigation Project, Province of Cavite.
Laoag-Vintar Irrigation Project, Province of Ilocos Norte.
Talavera River Irrigation Project, Province of Nueva Ecija.
Mangatarem Irrigation Project, Province of Pangasinan.
San Fabian Irrigation Project, Province of Pangasinan.
Mariquina Valley Irrigation Project, Province of Rizal.
San Marcelino Irrigation Project, Province of Zambales.

The survey of the following projects is in progress with surveying parties still in field :—

Pauili Valley Irrigation Project, Province of Ambos Camarines.
Lanao Irrigation Project, Province of Bataan.
Maragondon Irrigation Project, Province of Cavite.
Candon Irrigation Project, Province of Ilocos Sur.
Pampanga River Irrigation Project, Province of Nueva Ecija.
Penaranda River Irrigation Project, Province of Nueva Ecija and Bulacan.
Murong Irrigation Project, Province of Nueva Vizcaya.

The area of land to be irrigated by these projects is estimated at 45,000 hectares. The cost of making topographic surveys has averaged about P.0.75 per hectare.



Cable Gaging Station on Augat River near Norzagaray, Bulacan Province

Irrigation Projects Approved for Construction

Insular and municipal irrigation projects were approved for construction during the year under the provisions of Acts Nos. 2152 and 2755, respectively, as given on page 448. Allotments aggregating P.1,109,000 were authorized from funds appropriated by Acts Nos. 2736 and 2786 to start construction work. These

projects will irrigate a total area of 21,814 hectares and are estimated to cost completed P.2,378,500.

Project.	Province.	Irrigation area.	Estimated cost.	Allotment authorized.	Remarks.
		Hectares.			
Amburayan River	La Union	4,500	P.642,000	P.200,000	Insular system.
Baruyen River.	Ilocos Norte	1,000	56,000	56,000	Do.
Dingras.	....do.	1,200	106,000	106,000	Do.
Santa Barbara.	Iloilo	4,000	436,000	250,000	Do.
Tagudin.	Ilocos Sur.	1,300	100,000	100,000	Do.
Trinidad.	Benguet.	200	40,000	40,000	Do.
Talavera River	Nueva Ecija	8,000	928,000	310,000	Do.
Dipolog.	Zamboanga.	1,000	42,000	28,000	Municipal system.
Ayala.	....do.	183	7,500	5,000	Do.
Santa Maria.	....do.	131	21,000	14,000	Do.
Total		21,814	2,378,500	1,109,000	

Trinidad Drainage Canal on Baguio-Trinidad Road

Plans have been prepared and construction work authorized on the Baruyen River, Santa Barbara, Trinidad, Dipolog, Ayala and Santa Maria projects. The necessary plans have also been prepared for starting the construction of the Talavera River irrigation project, but a protest received from a number of land owners against the inclusion of land irrigated by an old irrigation system has held up construction work. Recommendations have been submitted that the land served by the old project be excluded from the system to be constructed by the government. It is believed that this recommendation will meet with the approval of the majority of the interested land owners and will receive favorable action, in which case the construction of this project can be undertaken in accordance with the revised plans at an early date. Irrigation notices have been published and served on interested land owners for the remaining projects as required by law, and construction work may be authorized on same in accordance with the provisions of the Irrigation Act on or before February 15, 1920.

The district engineer organizations are being utilized in the construction of irrigation projects whenever the work can be handled to advantage in this manner. In the case of the larger projects which cannot be handled to advantage by district engineers, project engineers are assigned in charge of the work. The project engineers will work under the supervision of district engineers in most cases but in some instances it has been considered advisable to have them report directly to the chief of the irrigation division.

Funds for construction purposes are being deposited as a rule with provincial treasurers for disbursement under a special arrangement whereby provinces will be paid a surcharge of 1 per cent. for this service, making the total surcharge for insular projects, 10 per cent. For the larger projects special disbursing officers are required, especially when construction work is accomplished by administration.

In designing irrigation projects considerable attention has been given to developing standard plans for canal structures. This standardization of design will effect a great saving in time and expense in the preparation of plans in the future.

In addition to the irrigation projects approved for construction, the construction of the following municipal projects was recommended :—

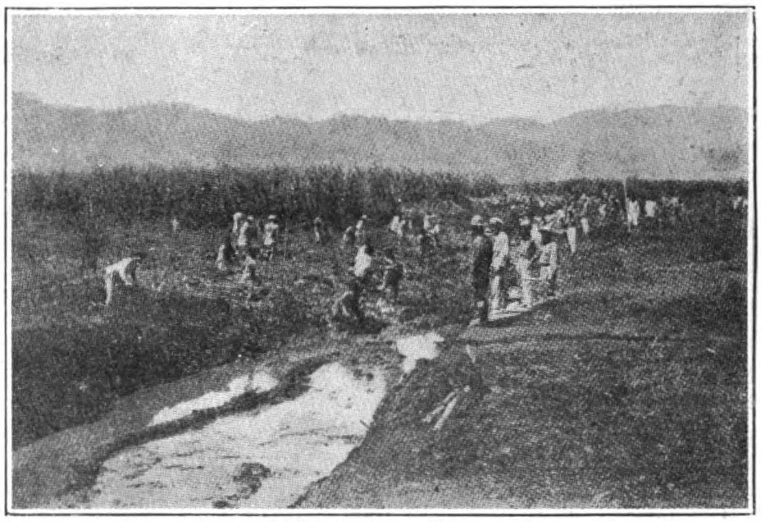
Pililla Irrigation Project, Province of Rizal.
Morong Irrigation Project, Province of Rizal.
Balaoan Irrigation Project, Province of La Union.
San Fabian Irrigation Project, Province of Pangasinan.
Mangatarem Irrigation Project, Province of Pangasinan.

All the above projects contemplate the improvement and extension of existing municipal irrigation systems and should therefore be financed under the provisions of Act No. 2755. The total estimated cost of construction of such projects is P.227,000 to irrigate an area of 6,600 hectares. Preliminary plans have been prepared and construction can be undertaken as soon as the municipalities concerned finance the cost of the proposed systems in accordance with the provisions of Act No. 2755.

Irrigation Projects Under Consideration

A large number of requests have been received during the year from provincial boards, municipal councils, and private parties for the investigation or construction of proposed irrigation systems. The division has given considerable time to furnishing information in connection with these requests. Where little or no data were available on proposed systems preliminary investigations have been made by district engineers or engineers of the division and reports submitted covering the importance and feasibility of systems. The more important projects under consideration with the hectarage and status of each are given in the table on page .

From that table it will be noted that the bureau has under consideration 45 important projects in 20 of the principal rice producing provinces that would benefit a total area of about 300,000 hectares. In addition to these projects there are a number of proposed irrigation systems pending investigation for which little or no data are available. Topographic surveys and preliminary investigations have been completed for 20 projects that cover a total area of approximately 130,000 hectares. In order that a more definite and systematic policy may be pursued in developing these projects, legislation is recommended that would provide funds to be invested in the construction of irrigation systems over a fixed period of years instead of depending on annual appropriations for this purpose. For some of the larger projects, it will take several years to make the necessary preliminary investigations, plans and estimates and from three to five years to accomplish construction work. The recent rice shortage has emphasized the importance of irrigation in the Philippines to insure the rice harvest and to increase the yield of rice.



Drainage Canal under Construction

Maintenance and Operation of Irrigation Systems

The San Miguel irrigation system in Tarlac province and the Pilar irrigation system in Bataan province were maintained and operated under the supervision of the division during the year at a cost of P.9,073.66 and P.1,450.47, respectively. The total income

from the San Miguel system was P.11.845 and the net income from the Pilar system, P.1,394.69. The San Miguel system suffered considerable damage in the August flood due to an island of sand forming in the river above the diversion weir and big trees lodging on the weir. This caused the river to destroy the up-stream protection dyke and to cut a new channel to the east of the headworks. A short section of the main canal and several canal structures were completely destroyed and a large amount of sand deposited in the main canal above the settling basin. It has been decided to make temporary repairs consisting of a pile dyke, to replace the earth dyke, and to force the river to fill in the new channel during the coming rainy season. If this plan is successful it will effect a considerable saving, since earth dykes with rock paving are estimated to cost over P.100,000. The "Compañia General de Tabacos de Filipinas," which own the land under the system was furnished a continuous supply of water by maintaining a temporary heading during the time that the main canal was being reconstructed to take water at the diversion weir, which was not damaged.

PROJECTS UNDER CONSIDERATION.

Province.	Project.	Estimated area.	Status.
		Hectares	
Albay	Quinale Lake Bato project	6,000	Awaiting investigation.
do	Malinao-Tabaco project	600	Do.
Ambos Camarines ..	Colassi irrigation project	2,000	Do.
do ..	Pauili valley irrigation project ..	10,000	Investigation in progress.
do ..	Barit River irrigation project ..	2,000	Awaiting investigation.
do ..	Uarus River irrigation project ..	2,000	Do.
Antique ..	Sibalom irrigation project	3,000	Preliminary survey completed.
Bataan	Dinalupihan irrigation project ..	2,500	Do.
do	Orion irrigation project	1,270	Topographic survey completed.
do	Lamao irrigation project	300	Investigation in progress.
Bulacan	Norzagaray irrigation project ..	30,000	Topographic survey completed.
Cavite	Naic Estate irrigation project ..	700	Recommended for construction.
do	Maragondon irrigation project ..	800	Investigation in progress.
Ilocos Norte .	Laoag-Vintar irrigation project	3,000	Topographic survey completed.
do .	San Nicolas irrigation project ..	4,000	Preliminary investigation, 1910.
Ilocos Sur ..	Abra River irrigation system ..	10,000	Topographic survey completed.
do ..	Candon irrigation project	3,000	Investigation in progress.
Iloilo	Jalaur River irrigation project .	18,500	Topographic survey completed.
do	Aganao River irrigation project	3,000	Do.
do	Pototan irrigation project	2,300	Survey and preliminary design made.
do	Cordova irrigation project	1,000	Topographic survey completed.
Isabela	Magat River irrigation project ..	40,000	Awaiting investigation.
La Union ..	Balaoan irrigation project	1,200	Recommended for construction.
do ..	Agoo-Tubao irrigation project ..	2,000	Awaiting investigation.
do ..	Naguilian irrigation project	1,000	Do.
do ..	Rosario irrigation project	1,000	Investigation in progress.
Leyte	Barugo irrigation system	1,000	Preliminary survey made.
do	Dagami-Tanauan irrigation system	14,000	Preliminary investigation, 1910.
do	Bato-Hilongos irrigation project	3,500	Do.
Nueva Ecija .	Pampanga River irrigation project	20,000	Investigation in progress.
do .	Peñaranda irrigation system ...	10,000	Do.
Nueva Vizcaya	Murong irrigation project	800	Do.
Occidental Negros ...	Binalbagan irrigation project ..	3,000	Awaiting investigation.
do	Bago irrigation project.........	10,000	Do.
do	Silay irrigation system	5,000	Do.
Pampanga ..	Porac River irrigation project .	1,000	Do.
do ..	Bamban River irrigation project.	3,000	Do.
do ..	Gumain River irrigation project.	5,000	Do.
Pangasinan ..	Agno River irrigation project ..	30,000	Topographic survey made. 1910.
do ..	Mangatarem irrigation project ..	2,000	Recommended for construction.
do ..	San Fabian irrigation project ...	4,000	Do.
Rizal ..	Mariquina Valley irrigation project......................	5,000	Topographic survey completed.
Tarlac	Capas irrigation project	5,000	Awaiting investigation.
do	Tarlac irrigation project	30,000	Do.
Zambales ...	San Marcelino irrigation project	4,000	Topographic survey completed.
	Total	307,470	

Some repair work was performed on friar lands estates irrigation systems in the provinces of Cebu, Cavite and Laguna by the district engineers under the supervision of the division. The operation of these systems is under the bureau of lands.

Water Rights

The division received a total of 158 applications for water rights during the year for irrigation and industrial purposes. Twenty-four applications were considered, twenty-one of which were granted by the secretary of commerce and communications and three disapproved, upon the recommendation of the irrigation council. The remaining applications have been advertised and investigated as required by law and are now pending action by the irrigation council. The water rights granted appertain to 1,162 hectares of irrigable land. A total of 417 applications for water rights have been granted since the passage of the irrigation act in 1912 for irrigating 50,353 hectares.

Of equal importance to the development of irrigation in the islands is the work that is being accomplished in the determination of existing water rights. Thus far complete adjudications have been made on eleven different streams involving 1,758 separate rights or parcels of land. These determinations affect the title to water for the irrigation of 8,032 hectares of land.

Surveys have been completed and maps prepared showing all water right locations on fourteen different streams. These surveys include approximately 50,000 hectares of irrigated land. The streams, including all their tributaries, which have been surveyed and are now pending adjudication are given in the following table :—

Stream.	Province.	Number of diversion ditches.	Length of main canal in metres.	Number of municipalities affected	Number of hectares irrigated.
					Area.
Pilar	Bataan	5	9,900	1	1,453.8
Calaguiman ...	do	11	18,600	1	481.5
Pansol	do	4	300	1	41.4
Talisay	do	16	18,650	2	782.4
Sierra Bullones	Bohol	26	18,300	1	347.0
Maitim	Laguna	1	2,000	1	1,230.1
Ange..........	Pampanga	3	4,000	1	1,200.0
Gogo..........	do	24	42,270	4	4,000.0
Nayon	Pangasinan and Zambales	20	29,320	2	1,175.3
Bued	Pangasinan, Union and Mountain Province ..	50	33,180	6	5,136.0
Baliwag	Nueva Ecija and Tarlac ..	210	85,465	7	22,999.5
O'Donnel, Moriones and Tarlac	Tarlac	1	4	7	10,114.0
Total area					48,961.0

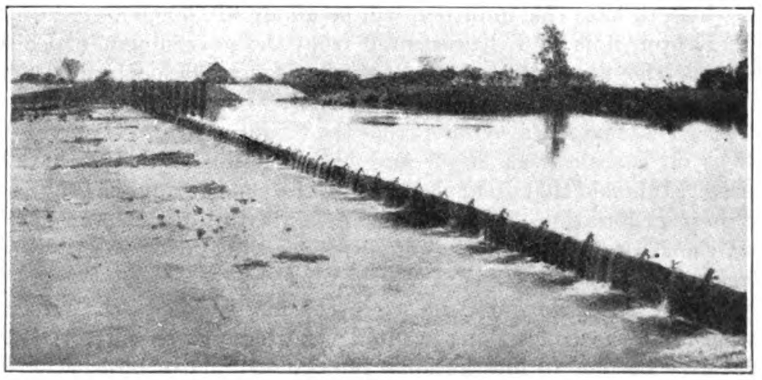
The division is at present several years behind in this work due to the lack of clerical and technical assistance. The system is simple, but the filing, indexing and tabulating of rights, and the correspondence with claimants, involve a large amount of clerical work which requires office assistants with several years experience.

The streams, in addition to those mentioned above which have been designated for adjudication on which no work has been accomplished are given in the following table :—

Stream.	Province.	Municipality affected.	Approximate land irrigated.
			Area.
Nasisi	Albay	Ligao and Oas..................	1,000
Ynarihan	Ambos Camarines	Naga, Magarao and Cabalanga ...	1,200
Maoguingoguing..	Ilocos Norte ..	Vintar	500
Nagsincaoan	Ilocos Sur	Cabugao	300
Ubbog	do	do	200
Parasapas	Pangasinan.....	Tayug and Natividad	300
Gogo and Buge...	Tarlac	Concepcion	1,000
Balingasay	Ilocos Norte ...	Sarrat	300
Banila	Pangasinan.....	Rosales, Baluñgao and Umingan ..	2,000
Total area			6,800

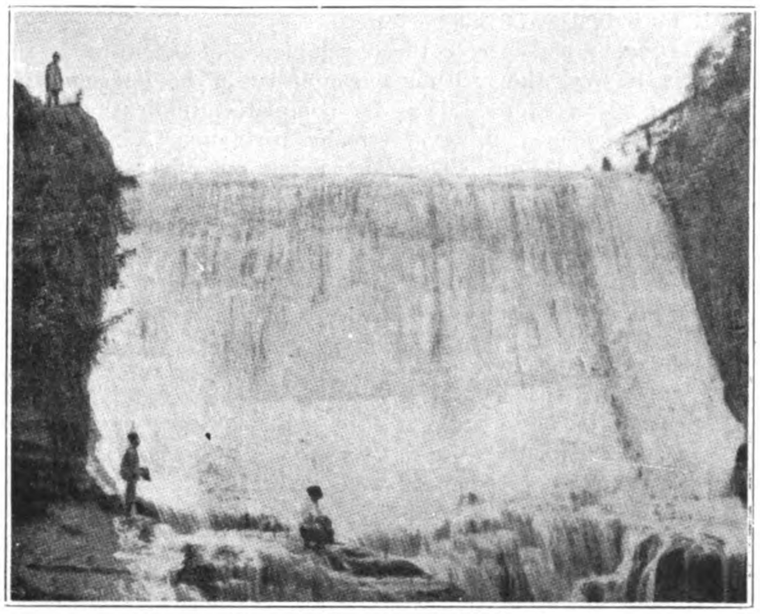
Amendment to Irrigations Law and Bond Issue for Irrigation Systems

A proposed act which will amend and compile the law relative to the appropriation of public waters for the development of water power and the use of public lands in relation thereto, and which would change the present policy of the government in allowing



Dam and Headworks, San Miguel Irrigation System, Tarlac Province

titles to waters and lands valuable for water power to pass permanently into the hands of private parties or corporations, and retain control of these valuable resources in the people though permitting their development and use through private enterprise, is another measure that deserves the preferential attent on of our legislators



Masonry Dam on Friar Lands, Cavite Province

Such a proposed act, if it is to be submitted to the Philippine legislature, must be so worded as to provide a definite policy, which is essential, and should secure the capital needed for the proper development of water power sites as rapidly as the public interest may require.

In order to increase the food production of the islands and remedy the shortage of rice which has been experienced in the past, and at the same time help the provinces and municipalities construct irrigation system, a proposed act authorizing provinces and municipalities to incur indebtedness not to exceed seven per centum of the aggregate tax valuation of their property, and to issue bonds covering the amount of said indebtedness payable in gold coin of the United States or its equivalent in Philippine currency, for the purpose of providing funds to construct irrigation systems, should be passed.

In a report on business conditions in Germany the Guaranty Trust Co. of New York, which keeps in very close touch with the German situation, among other things says :

"Krupps are employing 12,000 more workmen now than in the month immediately before the outbreak of the war. This total does not include workmen in five other manufacturing undertakings which are controlled by, or work in alliance with, the Krupps. At Essen, in addition to the casting and ralling operations formerly carried out, 73 different kinds of machines, apparatus or technical articles are being produced. The Krupps cast steel works have been extended from a pre-war area of 242 acres to 1,400 acres, and the construction of railway material has reached enormous dimensions.

"German manufacturers are securingc onsiderable orders in Argentina for fencing wire, rods, bars, billets, railway rolling stock, axles and wheels, and are offering prices with which no other country can compete. A German firm recently obtained an order for 4,300 tons of steel rails at prices far below American quotations and, in addition, the German makers are extending six months to one year credit to the buyers. Krupps recently obtained an order from Argentina for 10,000 steel wheels at a price of less than 50 gold pesos a wheel. Fourteen American, British and German manufacturers competed for the contract at prices ranging from 70 to 118 gold pesos a wheel.

"The Krupp concern has absorbed the Rhine Metalware and Machine Factory and that great war plant is now engaged in the manufacture of agricultural machinery and enamelware. Krupps control the Ernemann Works, Dresden (large manufacturers of cameras and moving picture apparatus), and also are specializing in the manufacture of cash registers, textile machinery and oil and sugar refining machinery."

The facts given here are indicative of the great industrial development under way in Germany and of the ability of that country to undersell the products of this and other countries. The fact that the Krupps are employing 12,000 more workmen than in the month before the outbreak of the war merely shows how little the industries of Germany really suffered by the war.

It is interesting also to note that the Krupps are becoming large manufacturers of cameras and moving picture apparatus, in view of the fact that German propaganda is preparing to flood this country through moving pictures disguised in such a way as to deceive almost the elect, but at the same time definitely intended to create a favorable impression for Germany and a spirit of hostility to our allies.

Krupps to Build Steel Works in Chile

According to reports from Chile, as published in the *Washington Post*, the Krupps have obtained concessions of enormous value from Chile for the purpose of establishing a branch plant of their German iron and steel and munition making industry. The Santiago papers are quoted as reporting that the amount to be expended for the purchase of an iron ore property, on which to base this industry, will be about $10,000,000.

Krupp, it is said, has secured from the government of Chile through the negotiations of a German general a concession for nearly 500,000 acres of virgin forest land covered with gigantic trees. These papers also report that the Krupps propose to establish works on a scale even larger and better equipped than those at Essen. It is said that great secrecy was observed during the progress of these negotiations for fear of creating ill-will against Germany and the Krupps for undertaking so vast an operation in iron and steel and munition making in South America.

If the reports from Chile as to the magnitude of the undertaking and the concessions granted the Krupps are correct, this deal may become of international importance and of international danger.

"Japanophobia"

Dr. Guy Potter Benton, president of the University of the Philippines, who has just returned to Manila from a trip of several weeks through Japan and China, cautions Americans against needless exhibitions of "Japanophobia." In a recent interview, he says:

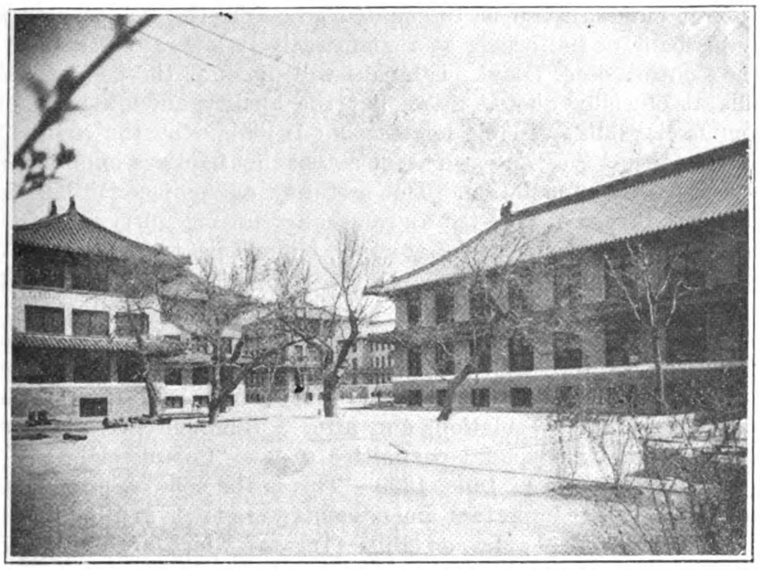
"It is doubtless patriotic for American authorities to be alert in safeguarding our interests, but to a thoughtful observer the rabid Japanophobia manifested in some quarters seems hardly warranted.

"Of course, my passports were carefully examined, but there were no unpleasant features connected therewith. The fact that I was an American seemed to guarantee me the most respectful consideration. Although I have traveled in almost every country of the world, I came away from Japan feeling that never, anywhere on earth, had I received more generous treatment. Polite consideration and sincere helpfulness were manifested on every hand.

"There may, of course, be an undercurrent of opposition to us that was not apparent to me but I believe, as patriotic Americans, we should be on our guard against hasty conclusions formed by people passing rapidly through Japan."

The Rockefeller Foundation in Peking

IN the announcement of 1920-1921 it is stated that the Peking Union Medical College is open for the instruction of students, of both sexes, in the Medical School and the Pre-Medical School. The Medical School offers a five years' course in medicine, including one year of special work in the laboratories or hospital, and also provides facilities for graduate study in all the branches of medicine. The Pre-Medical School offers a three years' course in preparation for admission to the Medical School.



Rockefeller Foundation Medical and Surgical Buildings

The Training School for Nurses will open for the admission of women students in October, 1920.

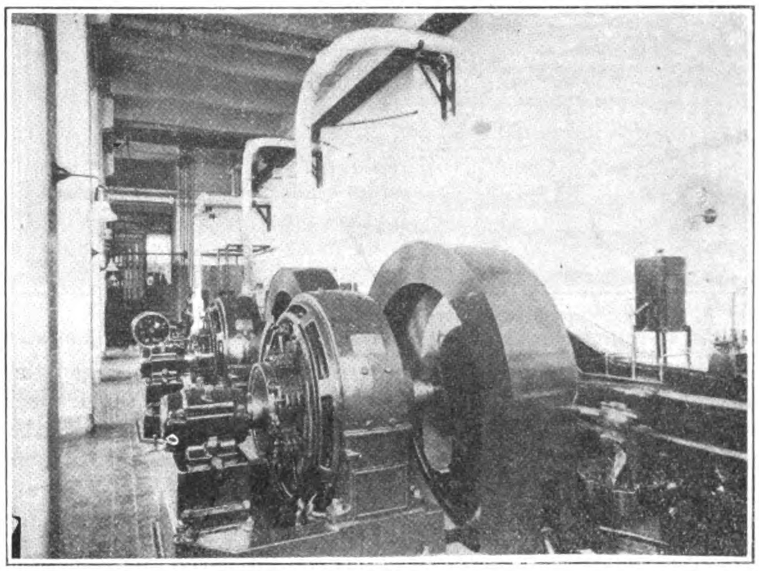
South Court. Showing Chemistry Building, etc.

History and Organization

The Union Medical College was founded early in 1906, following the disorganization of mission work that resulted from the Boxer outbreak. The American Board of Commissioners for Foreign Mission (Congregational), the Board of Foreign Missions of the Presbyterian Church in the United States of America, the London Missionary Society, and later the Peking University (Methodist), the Society for the Propagation of the Gospel (Anglican), and the Medical Missionary Association of London, all co-operated in the development of the Medical College, and maintained it until 1915.

On July 1, 1915, the China Medical Board of the Rockefeller Foundation assumed the full support of the Union Medical College, having previously acquired the property of the college. The terms of the transfer provided, among other things, that the work of the college should be conducted by a Board of Trustees, which should consist of thirteen members, one to be appointed by each of the six missionary organizations previously maintaining the college, and seven by the China Medical Board. Early in 1916 the Trustees secured a provisional charter from the Regents of the University of the State of New York, and in accordance with this charter adopted by-laws and leased from the China Medical Board the property of the medical school in Peking.

The period from 1915 to 1920 has been one of reconstruction, both of the physical plant and of the organization of the teaching staff. This period has witnessed the opening of the Pre-Medical School, in 1917, and the opening of the Medical School, in 1919. Higher entrance requirements have been adopted, and each year has seen an increasing number of students entering the classes of the Pre-Medical School. It is hoped that the entire plant, including the new hospital, will be occupied by the autumn of 1921.



Engine Room in the Power House

Buildings and Equipment

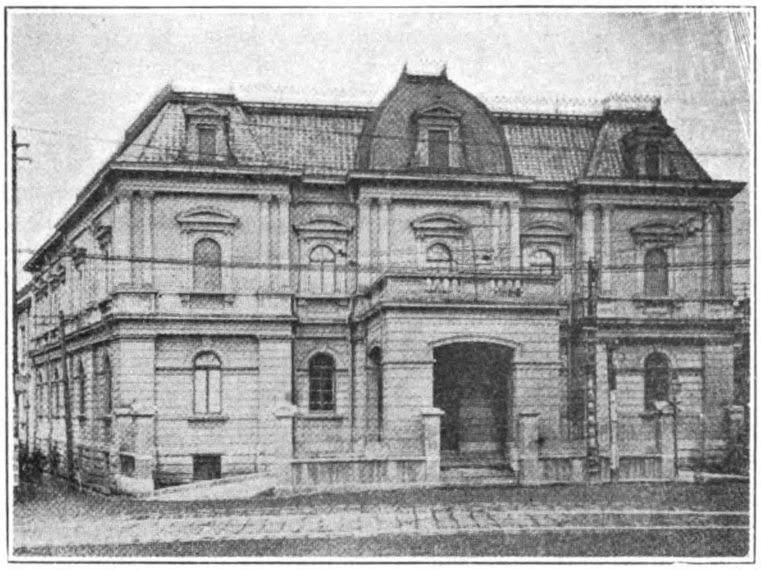
The Medical School group, in which most of the instruction during the first two years of the medical course is given, was opened in the fall of 1919, and comprises the first of the new buildings to be completed.

The new buildings are located on San Tiao Hutung, between Hatamen Street and Wang Fu Ching Street, in the property known as the Yü Wang Fu, which comprises approximately nine acres of land. All of the buildings necessary for instruction in the various branches of medicine, and for hospital purposes, are included in this group. These buildings are modern in every respect, and include the features and equipment necessary for elementary and advanced instruction in all of the medical sciences and clinical branches. A small private pavilion makes it possible for patients to secure the professional services of the staff without entering the public wards.

The Pre-Medical School, dormitories, and staff residences are situated within a few minutes' walk of the new buildings.

The Japanese Bill Market

JAPAN has passed through a serious financial reaction and weathered the storm. The reports of all the bank presidents for the last half of last year bear evidence to the close team work and co-operation existing between the Bank of Japan and the financiers and merchants of the country which enabled Japan to pull herself together and surmount what threatened for a time to become a panic. The reaction which set in during the first half of last year



The Tokyo Stock Exchange

resulted for a time in a state bordering on the chaotic, when the Bank of Japan stepped into the breach and warned the traders to dispose of their stocks and adjust their production while the bankers were advised to give more careful consideration to their advances. As a result, the banks became cautious and paid attention to the replenishment of their reserves so that by the latter half of the year cash in hand became so plentiful that many of them had to seek outlets for sound short term investments. There being a scarcity of gilt edged bills on the market a great demand was created for bank acceptances as well as for "stamped drafts"—the drafts so stamped being elegible for rediscount by the Bank of Japan. Such a state of affairs also afforded an excellent opportunity for the issue of government bonds and debentures, of which over Y.600,000,000 were issued during the last six months as against Y.400,000,000 for the first half year.

Commercial bills or trade acceptances in Japan form a large part of the bank transactions, and a very interesting description of this line of banking business was presented by Mr. Junkichi Miki, assistant manager of the Fujimoto Bill Brokers' Bank, Ltd., of Osaka in "The Street." As an introductory to his remarks on the bill market in Japan, Mr. Miki says that in so far as the Japanese money market is concerned, the commercial banks whose first function was to facilitate the commercial development of the country, made rapid progress during the past half century, and the custom of using commercial bills, in cases of deferred payment, has been instituted among the domestic traders by the discount service of those bankers.

The commercial bill is a credit instrument of deferred payment by which the sales of merchandise are settled. Such bills are created when the seller of merchandise draws a "bill of exchange" on the buyer for a stated amount, payable on a certain date as arranged, presents it to the latter and has it accepted by him ; or the buyer of merchandise draws it on himself, accepts it and gives it to the seller, instead of cash payment or an account on the books of the firm. These commercial bills are evidence of "trade acceptances." The acceptance of the payee becomes valid when he or his representative (in case of a company) signs his name on the face of the bill, usually in the column reserved for acceptance. The commercial bill as a credit instrument eliminates the uncertainty and disadvantage of deferred payment by book account, and allows the holder to keep his funds in a liquid, readily negotiable condition. If a commercial bill bears names of high repute in banking circles, it can be discounted any time the holder desires by his bank or bill broker at a comparatively low rate of interest. The Central Bank (Bank of Japan) will discount the commercial bills at officially quoted rates, but the quality and quantity of commercial bills available for discount is limited by the credit of the bills themselves, and also to the extent that banks or bill brokers want the accommodation. The maturity of commercial bills is a matter of agreement, but they usually run for thirty, sixty or ninety days, according to the available commitment of the banker's funds.

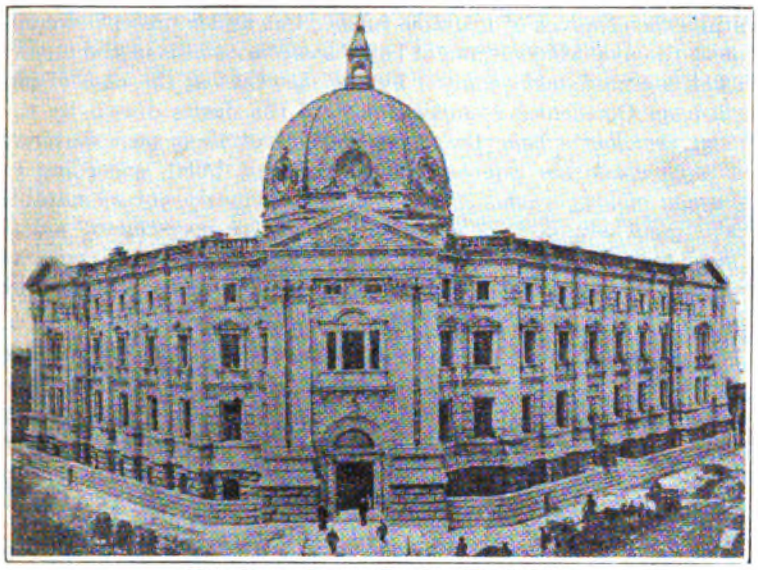
The law governing commercial bills was first promulgated in 1882, under the title of "Regulation of Bills of Exchange and Promissory Notes." It was in force until 1893, when a part of the old "Commercial Code" was brought into operation. This was a temporary regulation, and after a thorough investigation and revision by a special committee a new "Commercial Code" was put in force from June, 1899. This is the code at present in force, but further important amendments were made in 1911. The Code contains a chapter on Bills (Tegata) which regulates the form of bills of exchange, promissory notes and checks, the rights of the holders, the obligations of drawers, accepters, payees and endorsers of these instruments, etc. Legally interpreted, bills of exchange and promissory notes are formal instruments, containing absolute, unconditional promises to pay the stated amounts, and in which the signatory incurs a liability without reference to the reason or motive inducing him to do this. The holder of these

The Osaka Stock Exchange

instruments is protected still further by recourse to the special regulation known as "Exchange Action" (a documentary action) in the Code of Civil Procedure in case of non-payment at maturity.

We cannot overlook the important contribution of the large bill-broking bank to the development of the commercial bill market. With its specialized knowledge and expeiience in judging the credit standing of commercial bills and anticipating the future condition of the money market, it surpasses all others in discounting bills,

usually offering a lower rate of discount. The bill-broking bank also provides the banks with high grade commercial bills as the safest quick convertible investment, with the additional security of its own endorsement, and usually is able to offer bills of such amounts and maturities as the banks desire to discount.



Yokohama Specie Bank's Head Office

As the discount business of the bill-broking bank is carried partly by "call money" obtained from daily reserves or temporarily idle funds of banks in both city and country districts and sometimes by borrowing from the Bank of Japan to meet money stringency, it is obvious that the call money rate and the discount rate have a close relation on account of the demand and supply of money. Every day the bill-broking bank determines the rate both for call money and discounts on a reasonable basis, every factor which may influence the future condition of the money market being brought up for consideration. Therefore these rates have been recognized as one of the barometric indications of the money market.

Among commercial bills we have a special class called "spinning bills" (Boseki-Tegata). These bills, which carried the names of large spinning mills, appeared in the Osaka market after the Russo-Japanese war. As the spinning industry became prosperous, spinning bills have been treated as gilt-edged bills and always command the lowest rate obtainable. A large part of the spinning bills are discounted by bill-broking banks at lower rates than the official rate of the central bank on commercial bills and their rate is especially quoted as one of the money market rates.

Besides the commercial bill, the accommodation bill also has an important function as a means of financing commerce. The accommodation bill is a credit instrument which is not based on actual transactions in merchandise, but is created for the purpose of obtaining accommodation. The bill has various forms ; some are drawn and accepted by the same firm (single name bill), others are drawn and accepted by different offices of the same firm, and still others are drawn and accepted by two or more affiliated concerns. If the accommodation bill has well-known and responsible names as signatories, there should be no hesitation in treating them in the same manner as commercial bills.

The practice of "Bank Acceptances" as a credit system was recently introduced to the Japanese money market by the Bank of Japan. It is obvious that the observation of the successful development of the acceptance in the London market and its recent application in the New York market led to the development of this new proposition. As the acceptance itself is a method of granting credit to the banker's customers, its idea and usefulness are more or less familiar to modern banking. In the amendment of the Bank Act and its rules in 1915, one of the new items inserted in the standard bank statement was "Acceptances" as liability and "Acceptances per contra" as assets. Services such as the issuing of letters of credit, the guarantee of obligations or the lending of credit for accommodation were already performed in banks engaged in foreign exchange business. Yet the system of bank acceptances as a sound circulating credit medium did not exist until 1919.

The system of bank acceptances should be used for the purpose of financing foreign trade. The Yokohama Specie Bank, established in 1880, at present has a paid-up capital of Y.61,000,000 after the recent increase ; and, extending its business to all the world with branch offices abroad, it has done splendid service for the development of Japanese foreign trade. The Bank of Taiwan (established in 1909) and the Bank of Chosen have been particularly engaged in the financing of trading with Oriental and South Sea countries and recently expanded their business to the Occidental world. These three banks are chartered banks organized under special regulations of the government, and are called in market terminology "Exchange Banks." Of course there are a few commercial banks and a few branch offices of foreign banks which are conducting a foreign exchange business, but to a lesser degree than the exchange banks.

During the European War the Exchange Bank, particularly the Yokohama Specie Bank, had great trouble in providing and distributing loanable funds. While the abnormal expansion of foreign trade and the immense favorable balance of exports over imports which Japan had never seen before, brought to the bank an increasing demand for financing traders, the large accumulation of cash in London and New York, resulting from collections, was tied up by the policy of embargoing gold shipments from those countries. Under these abnormal circumstances the bank had to provide funds by the following means :—

(1) Absorption of comparatively long-term call money from the money market. This has brought into the market the sharp fluctuation of call money rates.

(2) Borrowing from the "Exchange Loan" funds of the Bank of Japan, the total sum of which ranges from three hundred million to four hundred million yen. (The Yokohama Specie Bank has the privilege of borrowing Y.20,000,000 at the rate of 2 per cent.) The natural consequence of this action was the inflation of banknotes.

(3) The government bought the cash holdings abroad of the exchange banks with the proceeds of government bonds issued specially for this purpose. (The authorized total amount of these special exchequer bonds was Y.500,000 ; they were issued successively in 1917, 1918 and 1919.)

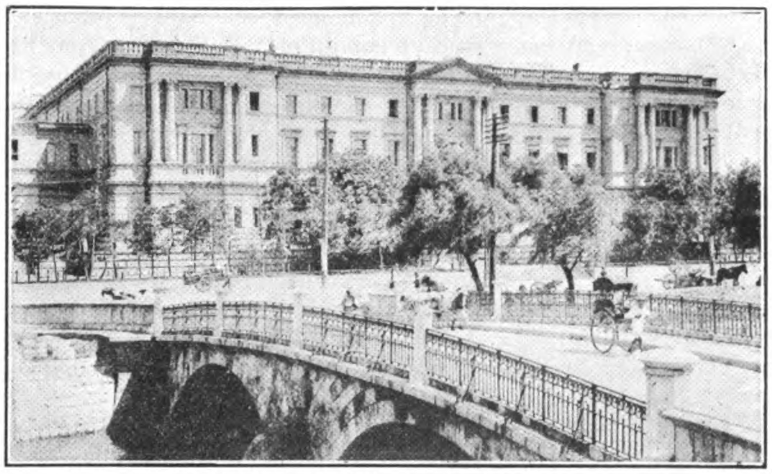
In order to meet the abnormal war conditions these means were fairly justified, but only as temporary expedients. The

The Mitsui Bank Building

inflation of banknotes resulting from the immense loans to the exchange bank, and the indifferent relationship between the exchange banks and the commercial banks were therefore seriously discussed with a view to changes.

In 1918 J. Inouye, Esq., the present president of the Bank

of Japan, then the president of the Yokohama Specie Bank, argued that the co-operation of the exchange banks and the commercial banks was absolutely necessary to solve the important problem of foreign trade financing, and suggested the establishment of a credit system of bank acceptances by which the resources of com-



The Home of the Bank of Japan

mercial banks would be fairly used in trade financing. A thorough investigation of the new system followed and finally in May, 1919, the Bank of Japan, after consultation with the influential commercial banks, announced that it would rediscount bank acceptance bills, as follows :

(1) For the improvement of foreign trade financing the Bank of Japan would rediscount bank acceptance bills based on actual transactions in trade, and favor such bills by the application of the same discount rate as on commercial bills, which are the lowest of official rates.—at that time 1.8 sen for Y.100 per day or an annual rate of about 6.5 per cent.

(2) For the financial maintenance or adjustment of industrial concerns which expanded during the war, the Bank of Japan would rediscount such accommodation bills of those concerns as are accepted by the banks, but only to the extent that the Bank of Japan judged proper, and to these bills it would apply the loan rate on bills secured by a stipulated kind of stock. The rate, at that time, was 2.0 sen for Y.100 per day, or about 7.3 per cent. annually.

The Bank of Japan recommended to the commercial banks to invest their reserves or idle funds in the usual short-term acceptance bills, the safest and most readily marketable instruments, and thus contribute to the development of foreign trade which is the cause of Japan's national prosperity.

The practical method of bank acceptances may be explained as follows :

In the case of imports of merchandise the banks issue letters of credit upon request of importers. The seller of the goods in the foreign country draws a draft when the merchandise is shipped, and later the banks accept the bill when presented. If branches of Japanese banks have bought the bill, it becomes the genuine bank acceptance bill.

In the case of exports of merchandise the practical use of bank acceptances is limited to some extent. This system is advantageous to banks engaged in exchange business only when, in the countries to which the merchandise is destined, the money rate is higher than in Japan or it is difficult to obtain the accommodation. It is advisable that the exporter make an arrangement with the banks engaged in exchange business such that, when he has shipped the goods and has delivered all necessary documents to the bank, the latter will accept his draft. Then the exporter can sell it easily to another bank or bill broker at a very favorable rate, sufficient to compensate for the commission paid for acceptance. This draft will be paid in maturity with the proceeds of discounting the regular documentary draft, which is drawn at such a date as to enable the bank to collect the draft at its due date at the destination.

The system of "Bank Acceptances" is indeed an ideal channel for the co-operation of the exchange banks and commercial banks in foreign trade financing, thus providing the former with the continuous resources of loanable funds ; but under present circumstances the available volume of bank acceptance bills in the money market is considerably limited by the fact that in the case of imports from Occidental countries most of the drafts drawn by the foreign merchants bear the denomination of their own currency and also sometimes interest clauses (interest bills), according to the usage of long years. Such bills are obviously not as suitable to the money market as commercial bills for investment, unless special arrangement fixing the rate of exchange which is to convert the value of the draft to Japanese currency is made between the exchange banks and the lender of the money.

Regarding the bank acceptance bills of industrial corporations, some of them have been used to obtain revolving funds to finance the purchase of raw materials, others to mobilize the bank's loans by the substitution of acceptance bills, and still others to meet the temporary need of money until the paying of capital or the issue of bonds. Quite a large volume of such industrial bills with bank acceptances had already appeared in the market in 1918.

After the formulation of the acceptance system by the Bank of Japan, around fifty million yen of bank acceptance bills was sold to the market quite rapidly and the bill-broking bank has done a remarkable service in the campaign of marketing these bills. It is recalled that in December, 1918, the bank acceptance bills drawn by the Kawasaki Dockyard for the purpose of refunding its deposits in London was offered to the market through the Fujimoto Bill Brokers' Bank, the first appearance of genuine bank acceptance bills based on foreign trade in the history of the Japanese money market.

Even with the special features of import bills explained above, it was still difficult to release the exchange banks from tying up loaned money. The weekly statements of the Bank of Japan, even after the adoption of the new plan, have shown that the "Exchange Loan" (mostly the loan to the Yokohama Specie Bank) was always ranging above the three hundred and fifty million yen level, in spite of the decline in the favorable trade balance in the first half of 1919.

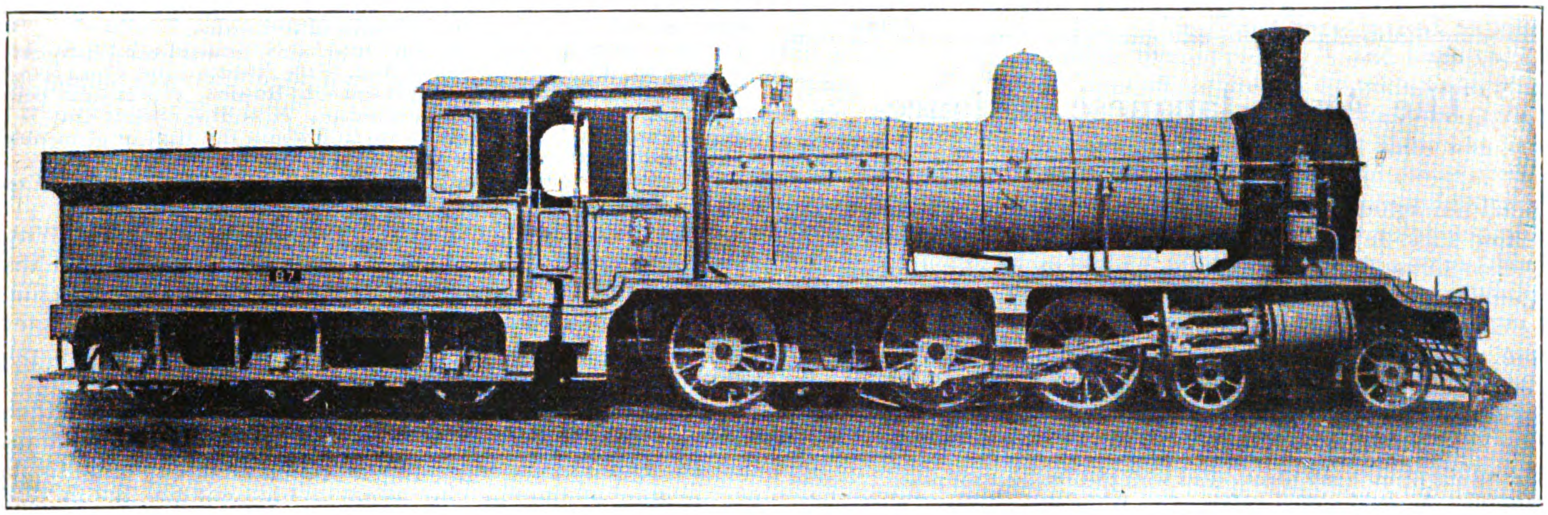
In August, 1919, the Bank of Japan announced that it would commence the rediscount of specially arranged bills drawn by the Yokohama Special Bank on commercial bills at official rates. These bills are secured by export bills which have been sent to London or New York for collection and are stamped on the face by the Bank of Japan as evidence that they are available for rediscount. Of course this plan was intended to provide the Yokohama Specie Bank with further loanable funds, and these so-called "Bank of Japan Stamped Bills" were offered to the market at the rate of around 6½ to 7 per cent. in the first instance.

Beginning with September, 1919, the money market tightened, and from October to December the Bank of Japan raised its official money rates three times, its purpose being to reconcile them with the higher market rate on the one hand and the deflation of currency as well as the curtailment of over-speculation on the other. The present rates are 2.2 to 2.4 sen per day or 8 to 8.7 per cent., the lowest for the discounting of commercial bills, the highest for loans on specified stocks.

It is said that the money stringency in the latter half of 1919 has been a serious obstacle to the development of the bank acceptance system which has just started, but we are assured that money will become somewhat easier later on and the old customs in the field of import trade will be gradually swept away so as to favor Japanese importers. Within a few years we will have a growing acceptance market as a channel of sound short-matured investment for the bankers' reserve funds.

British Locomotives for the S. N. R.

THE arrival and quick erection of six new locomotives in Shanghai recently marks the re-instatement of British rolling stock on China's railways. After a seven years' absence from the market British merchants have been successful in securing orders for the six locomotives mentioned above being the last shipment in a lot of thirteen. The locomotives above were manufactured by the North British Locomotive Company, Ltd. represented in Shanghai by Messrs. Jardine, Matheson & Co., Ltd. and were purchased by the Shanghai-Nanking Railway. The type of locomotive, together with its main dimensions, is shown below.



TYPE 4-6-0.

ENGINE.

Cylinders	Diameter	18-in.
	Stroke	26-in.
Wheels	Coupled, Diameter	4-ft. 9-in.
	Bogie, ,,	3-ft. 0-in.
Wheel-Base	Rigid	13-ft. 9-in.
	Total	24-ft. 11-in.
Working Pressure		180-lbs. per sq. in.
Heating Surface	Tubes	1,467 sq. ft.
	Firebox	163 ,,
	Total	1,630 ,,
Firegrate Area		28 ,,
Boiler Feed		2 Injectors No. 8
Tractive Force at 75% of Boiler Pressure		19,950-lbs.
Weight	In Working Order	60 tons 6 cwts.
	On Coupled Wheels	46 ,, 7 ,,

TENDER.

Wheels, Diameter	3-ft. 6-in.
Wheel-Base	13-ft. 0-in.
Tank Capacity	3,500 gallons.
Fuel Space	315 cub. ft.
Weight, Full	42 tons 5 cwts.

ENGINE AND TENDER.

Wheel-Base, Total	48-ft. 6-in.

Boiler Plates, Steel. Firebox Plates, Copper. Tubes, Brass.

World Demand for Locomotives

SIR W. G. Armstrong Whitworth & Co., Ltd., of London at present have in hand an order for 200 locomotives from the Belgian State Railways, secured in the face of sharp foreign competition. The entire contract given out by the Belgian government amounted to 350 locomotives, and it had practically been decided that this should go to a foreign competitor. The British firm, however, was at the last moment able to obtain the major portion of these.

In conversation with a Press representative a member of the firm said they had always made a point of going abroad after fresh markets. To bring work into the country the contract in question had been taken at a strongly competitive price which was a little advance of that quoted by the foreign rival. "The quality of our work, however," he continued, "was the deciding factor. Many of the workers in our locomotive department are old "gun men," who, of course, have always been accustomed to the highest class of work. The work being turned out now is as good if not better than before the war, whilst as far as we are concerned the workers are beginning to give a higher output, though there is still room for improvement in this respect. The order for 200 locomotives from Belgium is but a portion of those we have on hand. India, the Argentine, Java, Ireland, Trinidad and South Africa amongst other countries are to-day on our books. Considering it was less than eighteen months ago when we delivered our first locomotive, the development in this branch speaks well for the skill and thoroughness of the British worker. In 1919 we employed 800 men in our locomotive department at Scotswood ; to-day there are 3,000, and more will be required. There will be an increasing demand for locomotives from all parts of the world, and given cheaper coal and materials, together with a higher output per man, we shall have little to fear from foreign competitors, and Great Britain should supply a very large proportion of this demand.

"Germany, without doubt, is the competitor most to be feared. Not only does that country turn out a good class of work, but it is helped by the rate of exchange and the low cost of production. Under present conditions Germany is able to undercut us very considerably."

In addition to turning out large numbers of new locomotives, Messrs. Armstrong Whitworth have signed a contract for repair of Russian locomotives. This work will be undertaken in Great Britain, and alone will give employment to 2,000 men for five years. The engines will be shipped over to Russia at the rate of 300 yearly.

The Far Eastern Review

A Monthly Review of Far Eastern Trade, Finance and Engineering, Dedicated to the Industrial Development and advancement of Trade in Far Eastern Countries

ENGINEERING FINANCE COMMERCE

5 JINKEE ROAD, SHANGHAI, CHINA

Telegraphic Address: Farview, Shanghai

SHANGHAI, JULY, 1921.

The Anglo-Japanese Alliance

China's Protest

IN all the agitations surrounding the question of whether or no the Anglo-Japanese alliance should be continued, very little thought has been wasted on the original reasons for its existence. Those who have been loudest in denouncing the pact should read carefully the "Memoirs of Count Witte" published in *World's Work*, parts of which we have already reprinted in order to throw light on the Far Eastern problem. Especial attention should be paid to the closing chapter of these memoirs, in which Count Witte says:

"At one point in my negotiations with the Japanese for peace I became aware that we could obtain better terms if the peace treaty were complemented with a treaty of alliance with Japan. Very cautiously I alluded to the matter and received an evasive answer from Komura. It was clear, however, that the Japanese were not averse to a partial alliance with us. I telegraphed to Count Lamsdorff that, in my opinion, the negotiations should be conducted with a view to a Russo-Japanese alliance. As the minister's reply was evasive and rather hostile to my suggestion, I dropped the matter. And so, when the parley was over, we parted from the Japanese not as friends determined to support each other, but as enemies who had agreed to suspend the struggle for an indefinite period of time.

"On returning to Russia I perceived why my suggestion had not been welcomed by the government. As a matter of fact, in those days the idea of revanche prevailed among a considerable number of influential people, mostly speculators enriched by the war. It was preached by such powerful organs of the press as *Novoye Vremya* and favored by the highest court circles, including the emperor. One of the chief agencies of the revanche movement was the committee on state defense, presided over by Grand Duke Nikolai Nikolaievich. It actually took under consideration a number of measures aiming at the realization of the revanche dream.

"Premier Stolypin was, of course, with the militarists. He conceived the plan of building the Amur Railroad, so that we might have a railway which, running within Russian territory, would be secure from seizure by the Japanese. The project was laid before the Duma, and was welcomed by the notorious defense committee, headed by Guchkev. In order to impress the Duma with the necessity of the road, it was told that war with Japan was imminent and that it would indeed break out not later than 1911 or 1912, at the latest.

"And so the Duma authorized the construction of this line, which will constitute a heavy financial burden on the Russian people and which will in the end bring nothing but harm. Under the influence of the same argument the imperial council, too, gave its consent. I vigorously opposed the project, pointing out that in the event of war the new road would not be any safer from seizure by the Japanese than the Eastern-Chinese Railway. Besides, I argued, the railway would increase the influence of the Chinese in the Amur province to a dangerous extent. Above all, I insisted, the new line meant the expenditure of huge sums which could be spent, with better results, on defending our Far Eastern possessions and the existing Eastern-Chinese Railroad. But my arguments were in vain."

We hold to the belief that the ideals of a people cannot be overturned in a day by political revolution, and, when a stable government is restored, Russia will resume her traditional diplomacy and outlook upon Asiatic problems. In the mass of publicity about the Russian people, there is a book from the pen of former United States Senator Beveridge entitled "The Advance of Russia," which Americans should read. Written in 1900, it clearly revealed the workings of a race-mind whose fanatical ideals contributed largely to the catastrophe of 1914. Other powers cannot ignore these national characteristics in attempting to provide against future contingencies. Let us therefore remember what Senator Beveridge had to say about the idealism of the Russians and what it means in terms of international politics.

"Deeper than this idealism in the soul of this strange people is religion; and then call to mind the passion for order, its devotion to mere form; and with this, recall again that, buffeted for centuries by Asiatics on the east, by other Asiatics on the south, by warlike Europeans on the west, Russia has been compelled to develop a foreign statesmanship, unnecessary and unknown to any other nation, and a diplomacy skilful and resourceful beyond that of any other people of ancient or modern times. Take all these things into account and you have the great springs and sources whence flow the two sovereign ideals of the Russian people.

"These two ideals, are, first, the preservation of religious faith, and when the rest of the disputing world shall have grown weary of its spiritual conflicts, the restoration of that simple faith to all mankind; and the second is like unto the first—namely, the preservation of order, form and authority in civil affairs, and when the rest of the world shall have completed its cycle of liberty, and then license, and finally anarchy (which is what the Russians believe we are doing) to restore to the confused, hopeless, struggling peoples of the earth those forms of social order and political authority which the Slav thinks, are, after all, the foundation stones of civilization.

"Incident to this last is the more immediate Russian idealistic purpose of spreading her dominions over all of Asia, to the Russian mind, China is to be Russian, Persia is to be Russian, India is to be Russian. It is Russian power which is to restore the Cross to Jerusalem. It is Holy Russia that is to bring the authority of His faith to the land where the Saviour of mankind walked and taught and was crucified. So thinks the Russian.

"Russia was to carry the Cross to China. Japan was to be placed in vassalage. India was to become a Russian colony."

We cannot close our minds to the testimony of Count Witte. Russia expected to resume the conflict with Japan not later then 1912, and to pave the way she amputated Mongolia from China, to facilitate an attack upon Japan from the rear. These stern facts will stand and weigh in the balance against the hysterical protests of the Chinese against a renewal of the alliance.

There is an alternative to the Anglo-Japanese alliance. Given a strong China, able to defend her neutrality and fulfill her international obligations, the Anglo-Japanese alliance or any other similar pact relating to the Far East could be relegated into the limbo of forgotten things. China asks to have a voice in the preparation of any instrument that affects her status. Her wishes should be given most respectful consideration. Every effort should be made to conciliate the Chinese people. They are not altogether responsible for the ineptitude of their rulers, whose venality gave rise to this common impulse on the part of Britain and Japan to protect themselves against a powerful enemy, with whom the rulers of China had entered into a secret alliance.

If China can guarantee that her territory will never again be used as a bridge over which foreign armies can march to the attack of Japan and India, she is entitled to a place in the ranks of the great powers. In fact, when she can provide this guarantee, she will be the great power of the world.

The Chinese object to the phrase in the treaty which guarantees the integrity and sovereignty of their country. They should be taken at their word and called upon to assume their full share of the responsibilities for the maintenance of the peace of Asia. They should be invited to place their house in order, establish some form of stable government, reform their currency and laws, and above all, provide those guarantees which will obviate forever the necessity of an understanding between other great powers concerning the status of their country. The government of China, through its publicists, propagandists, mercantile and student bodies, has placed itself on record as opposed to a renewal of the alliance, but gives no assurance that it will assume the burden that the other nations lay down. Can China furnish that guaranty? Will the mercantile guilds, student bodies and bureaus of information, supplement their telegraphic protests by some sort of acceptable assurance that the Chinese army will reconquer Mongolia and preserve to the race the lands required for its expansion?

No matter how much one may sympathize with the patient Chinese people and those of its rulers who are honestly trying to apply reforms, the truth sticks out on all sides that until the military grafters are thrown out of power and a proper government established that will maintain law and order, guarantee the lives and properties of foreigners, and bring about some semblance of prosperity, the appeals of the guilds and students will fail to receive that consideration that otherwise would be due them. It is a sad sight when the mercantile and student bodies of a nation, led by a few agitators, usurp the authority of government and notify foreign cabinets if their wishes are not complied with, a commercial boycott will follow.

The recognized government of a people may not invoke such a threat in diplomatic intercourse without dire consequences. The picture presented in China reveals the existence of a paper government at Peking, holding no authority outside the walls of the capital, lacking funds, diplomatic prestige and an army and navy to enforce respect for its rights, a derelict amongst the nations. On the other hand paid agents of this government, working through mercantile guilds and student bodies, have established a sort of super-government employing the boycott as a weapon to enforce compliance with their ideas.

It is a dangerous situation. The weapon has been employed in the past against America and Japan and is now waved over Great Britain. To-morrow it may be France, or America's turn, if these nations fail to live up to the super-government's conception of the rights of China.

* * *

Dangerous Propaganda

Brings Ruin to American and Foreign Commerce in China

THE 1920 report of the commissioner of customs for the port of Shanghai makes interesting reading. As usual in these pithy reviews of treaty port trade conditions, the officials of the maritime customs keep close to facts, without elaboration. Commissioner Gordon Lowder states that "the prosperity *of the preceding year* (1919) *brought many new firms and dealers into the market, and it was largely the inexperience and rashness of these latter which brought about the final catastrophe.* "Is this statement a correct diagnosis of the causes which led up to the recent business panic? Very few new British firms entered the China market during 1919. The above official statement would seem therefore to imply that the catastrophe was precipitated by the large influx of new American firms lacking knowledge of local conditions and inexperienced in established trade practices and the mysteries of silver exchange.

This is not the first criticism that has appeared in the Far Eastern press directed against American methods, and it is well for Americans at home to know more about the causes which led up to the rush to open offices in China. THE FAR EASTERN REVIEW has refrained from any participation in the campaign to induce American manufacturers to come to China, inclining to a belief, founded on eighteen years' experience, that any great influx of new firms could result only in disaster and a loss of business prestige. We have watched, therefore, with interest, and without comment, the activities of others along these lines and wondered just how far they met with the approval of the few old established American hongs.

It would serve no good purpose to review at length the ramifications of this campaign, as many of the activities, such as those entered into by Mr. Julean Arnold, the American commercial attaché, was an honest effort to build up American trade and prestige in China. However, there were other influences at work closely allied with dangerous political propaganda, whose impulses did not spring from such disinterested motives. It was essential that new American firms should establish themselves in China in order to hold a fair share of the trade which came to them by reason of the war, but at the same time it was the duty of government officials, trade advisers, and chambers of commerce to point out to the manufacturers the peculiarities of the market and the necessity of adopting a fixed policy in order to profit permanently from the opening. Instead of this there seems to have been a sort of tacit understanding that everybody should work together to "*get them out here*" and let them learn by experience.

This policy was perhaps best expressed by ex-Minister Reinsch, who, on his arrival in San Francisco in October 1919, declared in his first interview with the press, that "now while China and Japan are at odds over the Shantung question, Americans can skim the cream off China's immense import and export trade." He followed this remarkable undiplomatic statement by adding, "China is one of the very few big powers which is absolutely solvent and can pay for what she buys with spot cash if she so desires." Is it any wonder, after listening to this kind of official talk, that Americans prepared to garner the pickings while the picking was good? One week after making the above statement, Mr. Reinsch was telling the bankers of Wall Street that China needed at once a loan of $200,000,000 in order to disband 800,000 surplus soldiers, build railways and dig irrigation canals. This was typical of the reckless propaganda unloaded on the American manufacturer in order to get them to come to China. Americans were invited to enter the market, not to establish themselves firmly and learn the intricacies of trade, but to "skim off the cream" by taking advantage of the boycott against Japanese goods. Americans responded. They skimmed the cream, and left the sour milk for those who have to remain and face the consequences. There is no use of closing our eyes to a situation, which even the American commercial attaché at Peking was forced to take cognizance of by requesting that all new American firms or their representatives arriving in China, should bring with them proper credentials in order to receive the support of his office. If Americans are to succeed in China, a new program must be adopted.

Coincident with the activities of Mr. Reinsch, American newspapers were deluged with a mass of free literature from a new organization in Shanghai called the "China Bureau of Public Information," presided over by Dr. F. C. Tong, and managed by an American named Geo. E. Sokolsky. The trend of the press campaign conducted by this organization was openly anti-Japanese and appealed to American firms to seize the opportunity to enter the field. We saw also the China office of the American government committee of public information, directed during the war by anti-Japanese writers, transformed into a commercial news organization, supported by leading American interests in Shanghai. It was not long before the new enterprise had a representative with an office in the Woolworth building in New York, sending out circulars inviting American manufacturers to open offices in China. The circular declared that the work of the agency had the full support of the American mercantile community of Shanghai and declared that only by entering the market in force could American trade succeed. "In numbers there is strength," it added, "only in this manner can Americans overcome foreign competition." The circular then offered to furnish American manufacturers with confidential and expert reports on any and all kinds of business opportunities in China in return for a very modest annual subscription. The circular in question received considerable publicity in New York newspapers.

There were other agencies of which we will have occasion to speak at some future time, working in complete harmony to bring Americans into the field in force, and the evidence all points to a common leadership. To our knowledge, not one of the "publicity experts" in this commercial campaign had ever received a business training. They were all new-comers in China, the traditional "griffins" handing out wisdom to American manufacturers in order to get their business. The burden of their song was, "come in, boys, the water's fine. All we need is numbers and the trade of China is ours."

On resuming direction of THE FAR EASTERN REVIEW after his discharge from the American army, the publisher of this magazine declined to subscribe to this campaign. We could not understand how the older established American hongs in China, familiar with conditions and the difficulty of competing with established foreign interests in normal times, could endorse a campaign, which, on its face, could result not only in disaster to the new surplus American firm, but bring loss and discredit upon themselves.

For eighteen years it has been the consistent policy of THE FAR EASTERN REVIEW to tell the American and British manufacturer the exact truth about opportunities for new business in China. We have refused to influence advertising by holding out

alluring prospects of profits. Invariably we have counselled those who came to us for advice (and they were many) to go slow, and entrust their agency to some responsible firm. Most of the larger American and British firms in China have benefitted by our policy. We knew China and its possibilities for engineering business, and we could look ahead to the time when the campaign launched by irresponsible publicity bureaus would have its inevitable reaction.

It is needless to stress the point. Enough articles have appeared in the American press during the past year to convince the most skeptical that the campaign was overdone. Misguided Americans who rushed to the new commercial "Eldorado," returned home richer in experience, disappointed, and in many instances, bitterly resentful for the manner in which they had been misled. It would serve no good purpose at this time to mention specific instances or quote names. One of our leading steel traders on his return from China last year declared publicly that it would take his own company at least ten years before they would be able to overcome the antagonism engendered against America as a result of the practices employed by irresponsible get-rich-quickers who swarmed into China in response to the hip-hip hurrah-come-in-boys-the-water's-fine campaign.

The aftermath of this hullabaloo campaign is now before us. It has remained for the commissioner of customs to tell a truth that others could not express because of the inquisitorial methods now practiced to suppress free thought and honest criticism in American papers published in China. American interests have been injured, American prestige dragged in the dust, in order that a few propagandists and irresponsible, self-styled engineering and commercial experts, might thrive. The inexperience of these "griffins" has helped to bring disaster to the entire community. We are paying the price of damphool publicity.

* * *

Profits in the China Trade

IN a speech delivered at the convention of the National Association of Manufacturers in New York on May 17, Mr. Iuming C. Suez, Chinese consul in that city, gave his views of American trade with his country. Mr. Suez evidently failed to consult with any of the high American advisers to China before drafting his speech, and said things, which, if true, would greatly embarass American firms in China. In the opinion of Mr. Suez while Americans have splendid organizations for marketing their products elsewhere, they have none for China.

"Standardization of products is one of the essentials of foreign trade," said Mr. Suez. "You have attained it to a remarkable degree at home ; for the China trade you have not standardized your products and their prices to meet the popular demand in China. A method should be found to lower the cost of production of American goods to be sold in China. The purchasing power of the Chinese masses is comparatively low, and will remain low unless their earning power is enhanced by the development of China's resources and industries.

"Another factor enters into our consideration of standardization. From reliable sources it is ascertained that American import houses in China consider a profit of 30 per cent. to 25 per cent. entirely justified ; whereas British houses would be satisfied with 20 per cent. to 15 per cent. French and other European houses with 15 per cent. to 10 per cent. German and Austrian houses with 10 per cent. to 2½ per cent. and Japanese concerns with 5 per cent. to ½ per cent.

"The reason for exacting a wider margin of profit is probably due to the fact that American houses consider their business transactions as accidental and do not look for a continual flow of business or for standing orders. That the Japanese traders can afford to take less profit is clear, for the distance and the time involved to complete a transaction is short and the turnover is quick. Indeed, the import business in China is conducted on a turnover basis, depending on a large turnover at a small margin of profit. A standard for profit marking should therefore be set to enable you to compete successfully. Another matter for standardization would be the terms and conditions of contracts. American merchants are typically obliging in making concessions when terms and conditions of contracts are discussed without reference to home offices and manufacturers, and would rather go by default and be exacting afterwards ; whereas European merchants would be very strict and exacting in the initial stage of the transaction, and be reasonable and obliging afterwards, thus making provision for concessions when occasion arises.

"The Chinese business men would invariably prefer to do business on the basis of being a mean man in the initial stage and a gentleman throughout the transaction, meaning thereby, driving as hard a bargain as a mean man could in the beginning, but living up to the bargain as a gentleman. You have to conform with Chinese standards as well as with some European standards."

At least one American by the name of F. W. Cox, who has lived in Shanghai, promptly corrected the impression made by the consul of China, in a letter to the *New York Times*, in which he said that "when a statement like this is made by a Chinese diplomat, before such a body of men, it is a very serious matter. In fact, it would mean the deathknell of our export business to China, if correct.

"Inasmuch as there is so closer buyer in the world than the Chinese and we have always been able to do considerable business with them. this of itself would seem to disprove the statement. However, it is too serious to depend on this disproval alone, as it is not at all unlikely that it will be used as a basis of propaganda by our competitors.

"There is no difference in profits demanded by British and Americans, and to the best of my information very little, if any, with others, where the service rendered is the same. The fact is that in some cases Americans have gone to considerable expense to furnish expert help and service : in such cases profits must be such as to take care of this extra burden."

It would seem that here is a very good opportunity for American business men in China to conduct a propaganda of education amongst their friends in high Chinese official circles. It hardly seems like playing the game to have the representative of the Chinese government in New York misrepresenting their abilities and profits when Americans are active in boosting the cause of China.

* * *

The Right Spirit

ON the occasion of signing the contract in New York for the construction of an electrically-driven ship by an American shipbuilding company for the Japanese navy, a dinner was held at the Hotel Biltmore and the usual exchange of complimentary speeches took place. Captain Yokura of the Japanese navy who signed the contract on behalf of his government, struck the right note when he declared, "as our commercial relations increase, the bonds of friendship will be strengthened." In referring to the present tension over the Island of Yap, Judge Elbert Gary, chairman of the board of directors of the United States Steel Corporation, said that all nations were selfish when their material interests were concerned, but that that was no reason why they should not be friendly. "A man who had a full stomach does not appreciate the hunger of another who has not enough to eat," he said. "A man with money in his pocket is not apt to have naturally the same sympathy for a poor man that one poor man has for another.

"Now, if Japan needs an island in the Pacific, she has a perfect right to express to the world that she needs it and would like to have it. That does not mean that she is entitled to it.

"It is claimed that we have certain interests growing out of the cable situation in Yap, and Japan is in need of Yap. She is in need of some other islands there. I am not going to discuss here what took place between Japan and England and some other foreign countries, but I would like to impress this point.

"Simply because the United States desires to maintain forever certain rights there or because Japan needs to maintain forever certain rights there, does not settle the question, and it is nothing against either of the parties interested because either of them makes certain claims. It is a matter of disposing of all of these questions in an open, fair, frank and honorable way.

"Can any of you tell me when the United States or any other country has ever asked Japan to sit down at a table and discuss any question of disagreement when Japan was not perfectly willing to sit down and talk it out, generally waiving more or less of the things she believed she was entitled to ? Could anything be fairer or more just than that ?

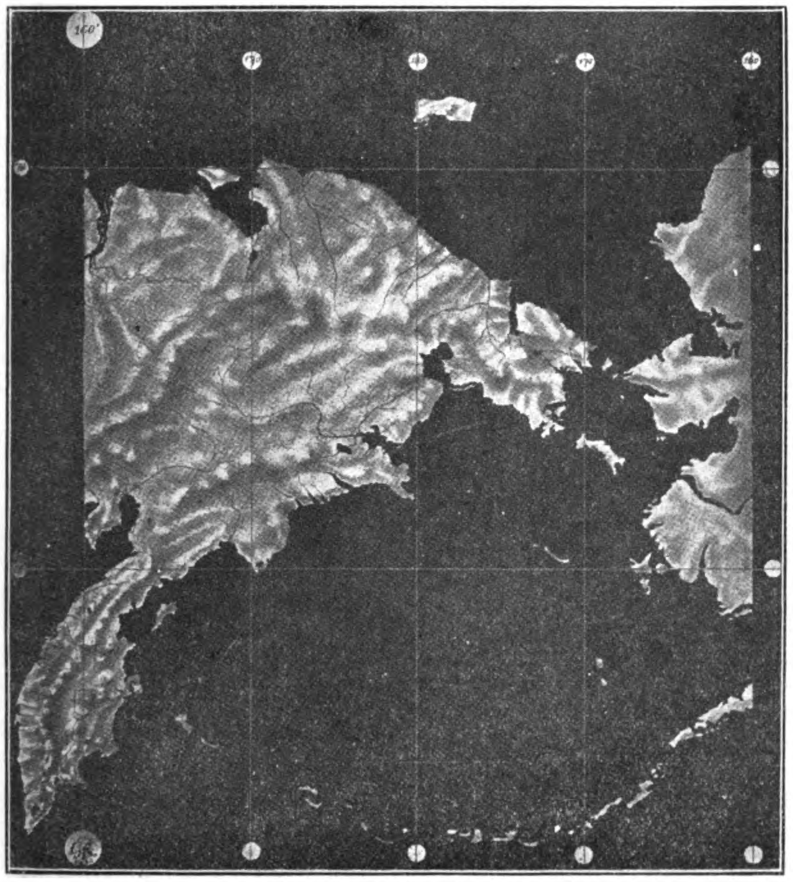
"So far as I am concerned, I want to say that, until Japan does something that seems to me to be intentionally wrong or unfair, I am going to be the friend of Japan."

A sensible American, is Judge Elbert Gary.

* * *

A Russian Warning

THE following interesting sidelight on American flirtation with the development of Siberia, comes from a little monthly magazine edited and published at the consulate of Russia at San Francisco, called "Siberian Opportunities." It says :



Relief Map of the "Vanderlip Concession" in Eastern Siberia

"There has been much speculation recently about the areas "granted" to Mr. Washington D. Vanderlip by the group of irresponsible communists at Moscow. This concession, judging from what is known at present, has been received with the understanding that American capital would enjoy exceptional rights in Soviet Russia where no Russian capital can be invested, where all private property is nationalized and where no individual is expected to have any commercial, industrial or even private business.

"It is understood that the local Russian governments, who consider that the Vanderlip concession lies in their dependency, have expressed themselves hostilely toward any transaction in land beyond the reach of the commissaries of Moscow.

"The American Russian chamber of commerce expresses itself in the January number of its economic bulletin as follows :

"Speaking of using a long spoon when one sups with the devil, it is interesting to note Lenin's statement concerning the much advertised Kamchatka concession of Washington B. Vanderlip. On November 23, a month after Vanderlip left Russia, Lenin made a long address before the Moscow district conference of the Russian communist party, which was duly reported in the official Soviet newspaper, *Pravda*, a copy of which has just come to hand. In the course of this address, Lenin said :

"The differences between our enemies have recently increased, particularly in connection with the proposed concession to be granted to a group of American capitalist sharks, headed by a multi-millionaire who reckons upon grouping around himself a number of other multi-millionaires. Now all the communications coming from the Far East bear testimony to the fact that there is a feeling of extreme bitterness in Japan in connection with this agreement, although the latter has not been signed yet and is so far only a draft."

"There seems to be a striking divergence between Vanderlip and Lenin. Vanderlip claims that he has a concession duly signed ; Lenin says it is only a draft, not yet signed. Poor Vanderlip ! —easy dupe and blind propaganda tool. The merest tyro could have advised him better on Soviet business methods.

"This will give our readers another point of view on this matter. The apparent inconsistency of dealing with people and laughing at them at the same time is the usual bolshevik method of conducting business. Where millions of American dollars are to be invested, this duplicity becomes rather disquieting.

* * *

The Press Congress of the World

PLANS for the holding of the great press congress of the world in Honolulu from October 4th to 14th, 1921 are now rapidly taking shape. From a description of what the committee intend will take place it seems that no effort will be spared to make of the congress a time of good fellowship, a time of gay festivity, as well as a time when much will be accomplished in the way of more serious work. Honolulu itself offers much to visitors and the people of Honolulu are by no means backward in their hospitality so that it may safely be assured that the pressmen of the world assembled there in October will enjoy a time perhaps to be unexcelled again. To mention a few of the delights which await them there is surf-riding, automobile rides around the spectacular mountains that overlook the no less spectacular valleys of the Island of Oahu, visits to the noted Haleiwa Hotel, trips in glass-bottomed boats and other events too numerous to mention.

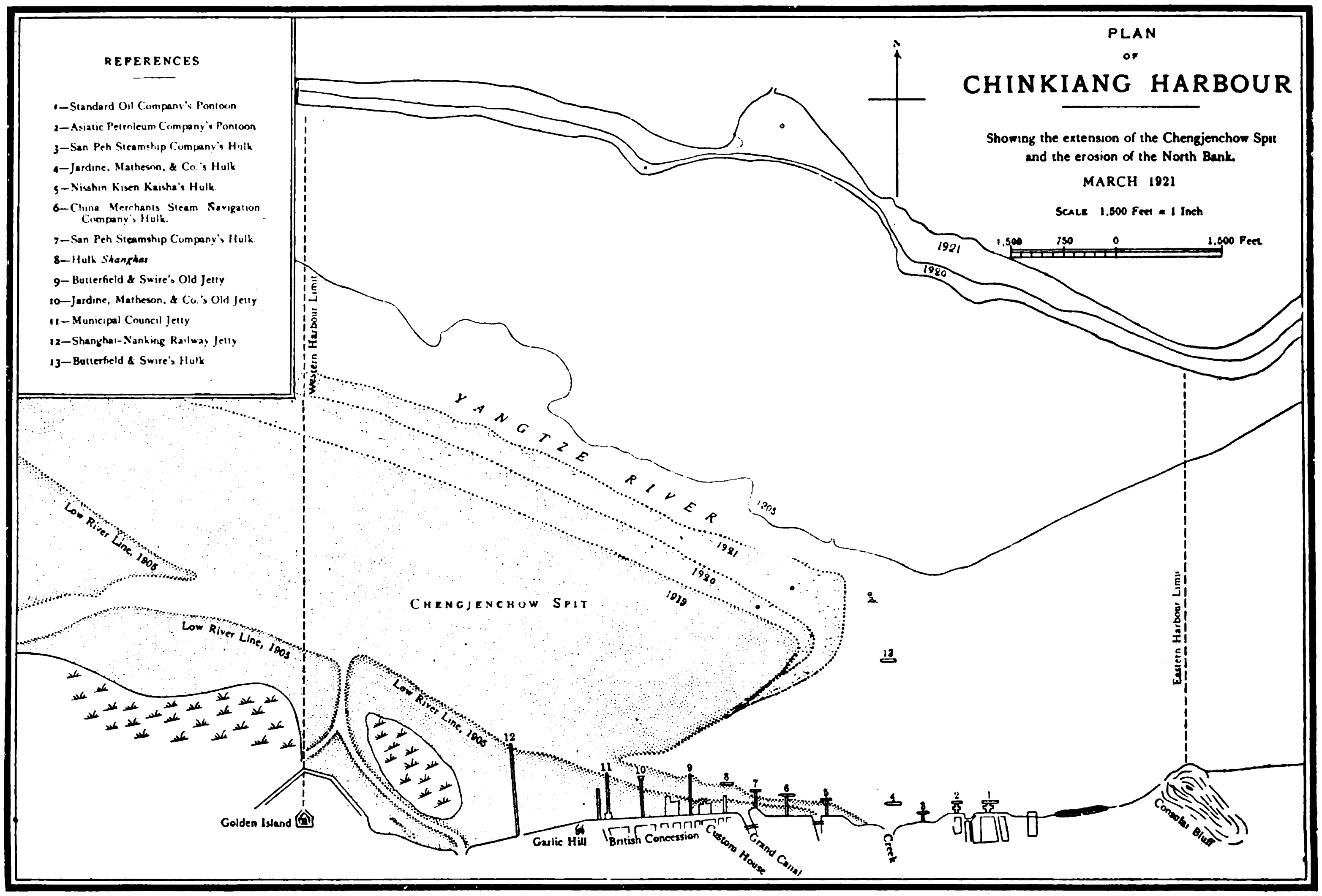
Another feature that will prove of great interest will undoubtedly take the form of visits to some of Honolulu's schools, for it is here that the process of handling the well-being of the melting pot of the Pacific is best exemplified. It is recorded that in one school alone there are more than twenty distinct nationalities, and it is no uncommon sight to see a dozen and more different types of costumes upon children of an equal number of races in the same grade.

But of course there is more in store. Visits will be made to the other islands of the Hawaiian group famous for their remarkable beauty and interest. Favored indeed are the pressmen who will be able to partake of the program, but barely outlined here.

An Appeal to the Deaf

The Commissioner of Customs at Chinkiang Sounds the Warning to a Grave Danger

THE following report on the state of the Yangtze River at Chinkiang should be read in connection with the article on the opposite page describing the plan of an American engineer for premanent Chinese famine relief through flood prevention works on the Yellow River. Now comes the commissioner of customs at Chinkiang and tells us that the work of Mr. Freeman and others will be worthless unless attention is first paid to the training of the mightier Yangtze, which, if permitted to work out its own will, may some day break through its northern banks at that point and sweep over the plains of northeastern Kiangsu and combine with the flood waters of the Hwai River, with consequences that will stagger humanity in its toll of human lives.



"Though it was hoped that some attention would be paid to the deterioration of the Yangtze River generally, and particularly to the present condition of this port—which, at the moment, is probably the worst sufferer from years of neglect,—it is recorded, with regret, that nothing has been done to improve matters. The mudbank, known as the Chengjenchow Spit, continues to grow in extent and solidity ; and the attached chart, showing its progressive development during the past 16 years, and the naturally simultaneous erosion of the north bank of the river, indicates clearly that, unless some measures are immediately taken to stabilise the river, there is a serious probability of the Yangtze doing what the Yellow River did between 1854 and 1856, and finding a new mouth for itself far to the north-east of the present channel. A glance at a map of China will show what this would mean. The present northern limit of the Chengjenchow bank practically coincides with the line of the north bank of the river in 1905, and is now over a mile away from the Bund-line of the British Concession. The condition of the river and the urgent necessity of taking steps to prevent its further deterioration formed the subject of resolutions passed by the conferences of British chambers of commerce, in China and Hongkong, held at Shanghai in 1919 and 1920 ; but these sound recommendations have apparently been overlooked. This is most unfortunate in view of the immense volume of trade in the Yangtze Valley, and the enormous losses in business and revenue that would result from even a temporary diversion of the navigable channel of the river towards the north-eastern coast of this province (Kiangsu), which would appear to be inevitable, unless prompt action is taken to prevent such a catastrophe. It is very important that a commission should be appointed without delay to go into the whole question of improving the Yangtze and its tributaries and preventing further deterioration, pending the elaboration by leading conservancy experts of a general scheme of conservancy and the appointment of a permanent staff, and the necessary machinery, for the maintenance of the waterways which form the Yangtze Valley water system. Though steps have been taken to improve certain rivers and harbors in China, nothing has been done for the Yangtze, the most important waterway in the country. As far as can be ascertained there is not a single dredger on the river."

Permanent Chinese Famine Relief

AFTER many years of discussion, the great plans for the Hwai River conservancy and Grand Canal improvement have resulted in another and perhaps more feasible and economical scheme devised by John R. Freeman, consulting engineer for the American International Corporation. One wonders if anything will ever come of these earnest and painstaking surveys to benefit China? It is easy to go back to the Hwai Valley famine of 1911 which took its

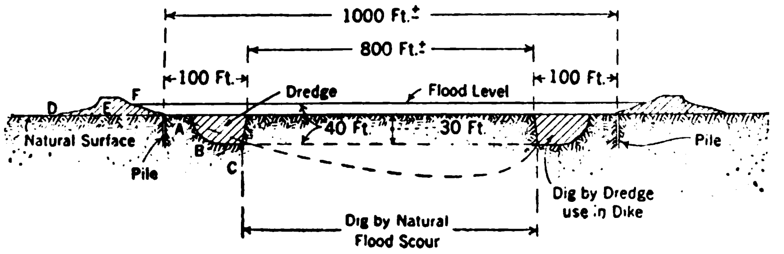


Figure 1

This Scheme for Using the Natural Flood Scour in Control of the Hwai River is also Proposed for the Yellow River

would be built two parallel ditches, each 75 feet wide, within the five-mile-wide stretch now protected on both sides by dikes. The outer sides of the ditches would be of stone and concrete. In the flood season the waters of the river, flowing in these ditches, would eat away the intervening 800 feet of soil and would make for itself a permanent bed. The stone and concrete of the outer sides would keep the water from washing away land in that direction. Under this plan the river would eventually have a width of about 1,000 feet, including the ditches and the 800 feet in between.

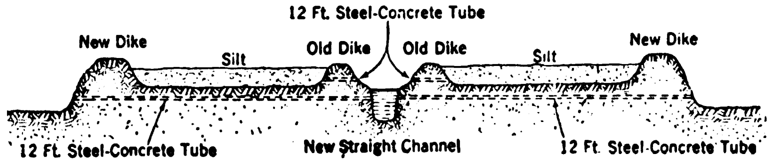
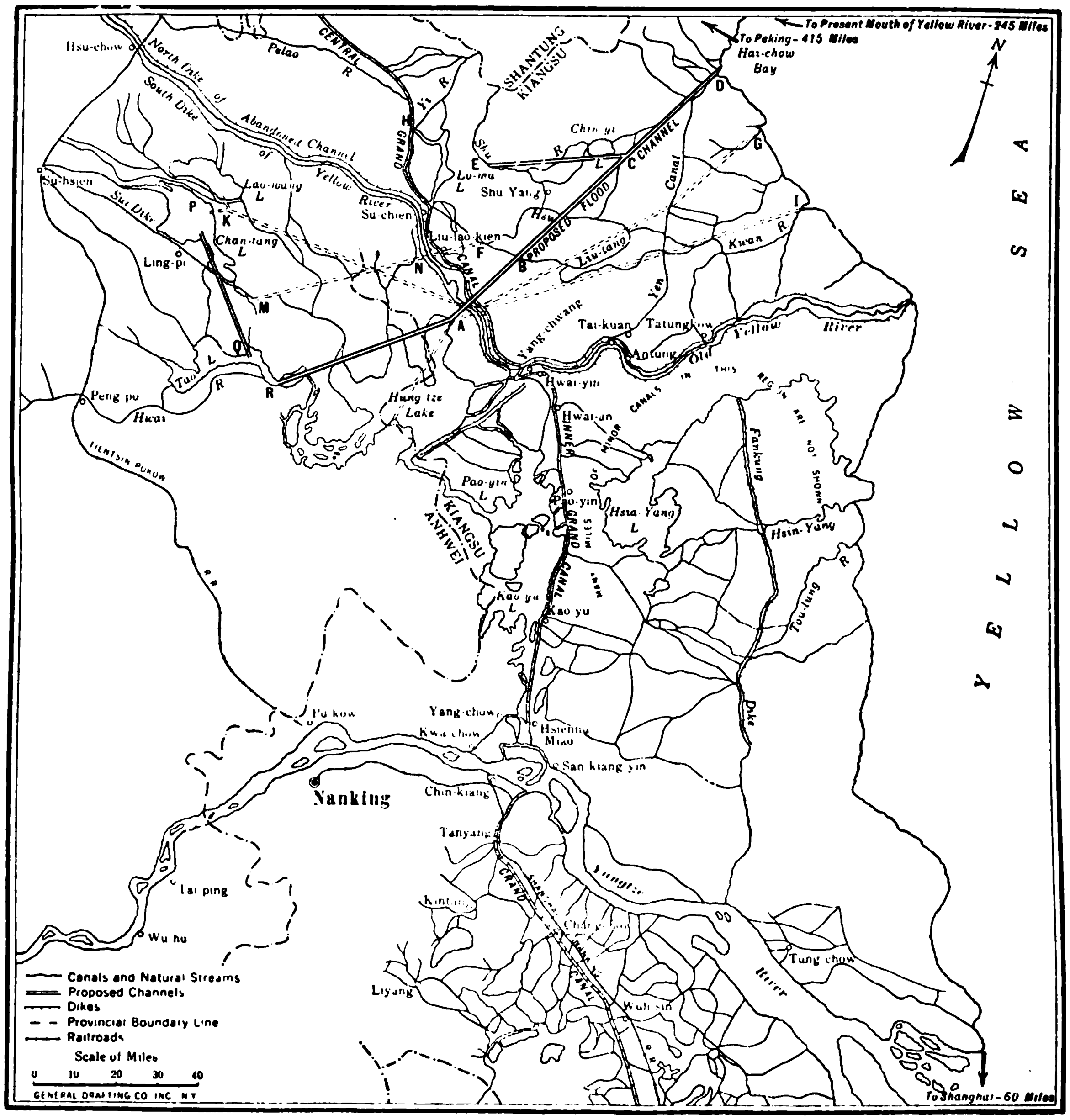


Figure 2

Sketch for a Reclamation Plan that Provides New Dikes to Protect the Yellow River Basin from Floods

toll of victims in the same manner as the present calamity in adjacent districts, and review the efforts of the American Red Cross Society to find a means to do away with future floods in this region, the work of Mr. C. D. Jamieson, the labors of Chang Chien's staff of Chinese engineers, the surveys of Colonel Seibert, and lastly, the investigations of the Siems-Carey Company. This, however, would lead to nothing. It is gratifying, however, to see that Mr. Freeman has tackled this problem with a vigor and viewpoint which must commend his work to the engineering community, as offering more of a permanent solution than any of the preceding schemes. The Freeman scheme contemplates making the Yellow River dig a permanent bed for itself; it includes, at the same time, the construction of a short-cut channel from the Hungtze Lake district to the sea at Haichow. The lakes in that district now drain into the Grand Canal, which, as a result, frequently overflows its banks and devastates the surrounding country. The engineer has evolved the scheme of digging his new channel a distance of eighty-five miles. In connection with it would be reservoirs, and the water from these would irrigate extensive tracts where now, in a rainless season, the sun bakes the soil as hard as brick and kills all growing grain.

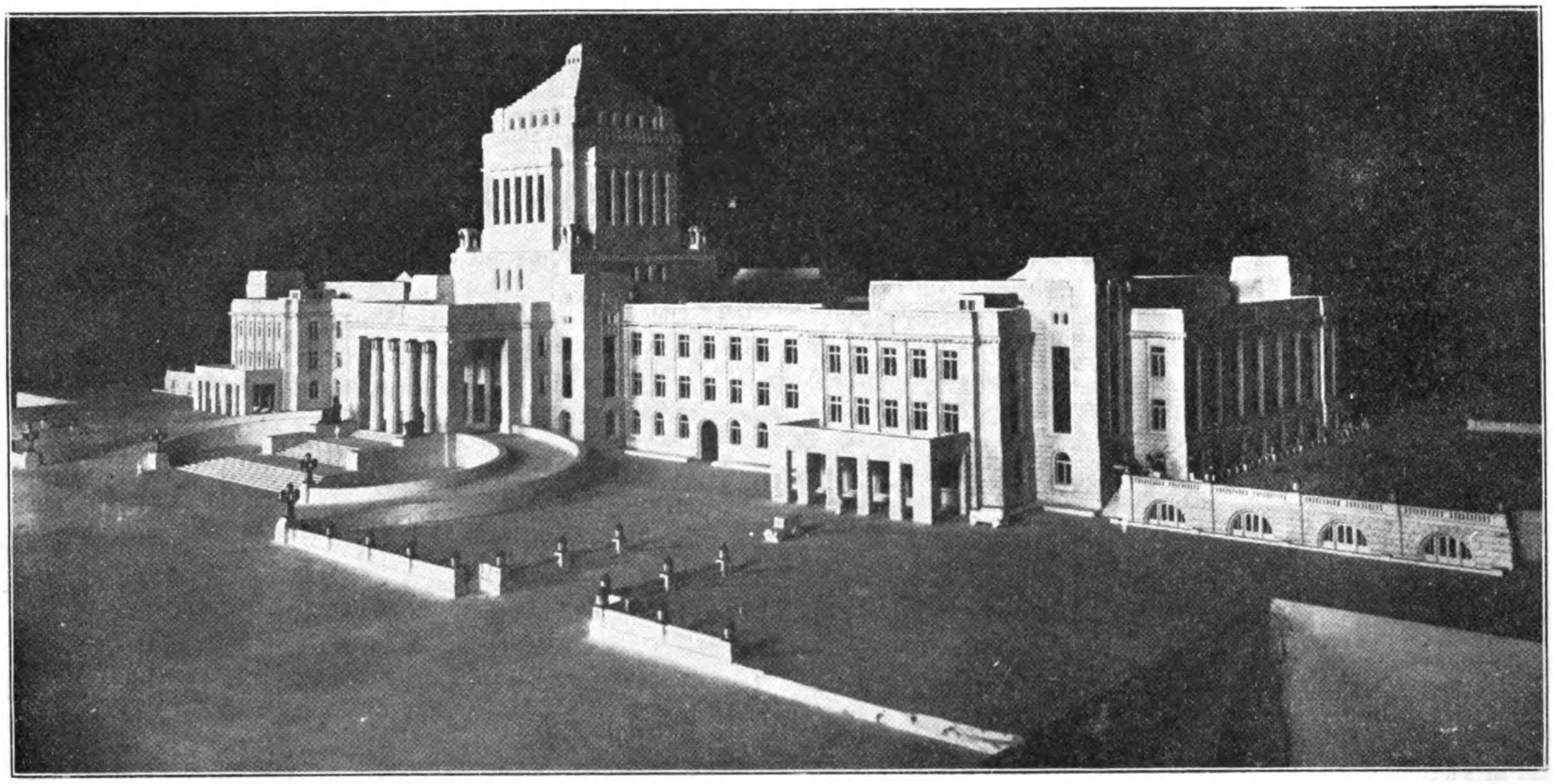
Along the Yellow River, if the Freeman proposal were adopted,



Freeman Plan for Preventing Flood and Famine in Shantung and Kiangsu

The Yellow River, by Digging its Own Deep Channel to the Sea, would be Converted from "China's Sorrow" into a Navigable Stream and Reclaim Millions of Acres of Waste Land

The Map and Plans on this page are reproduced from *Asia*.

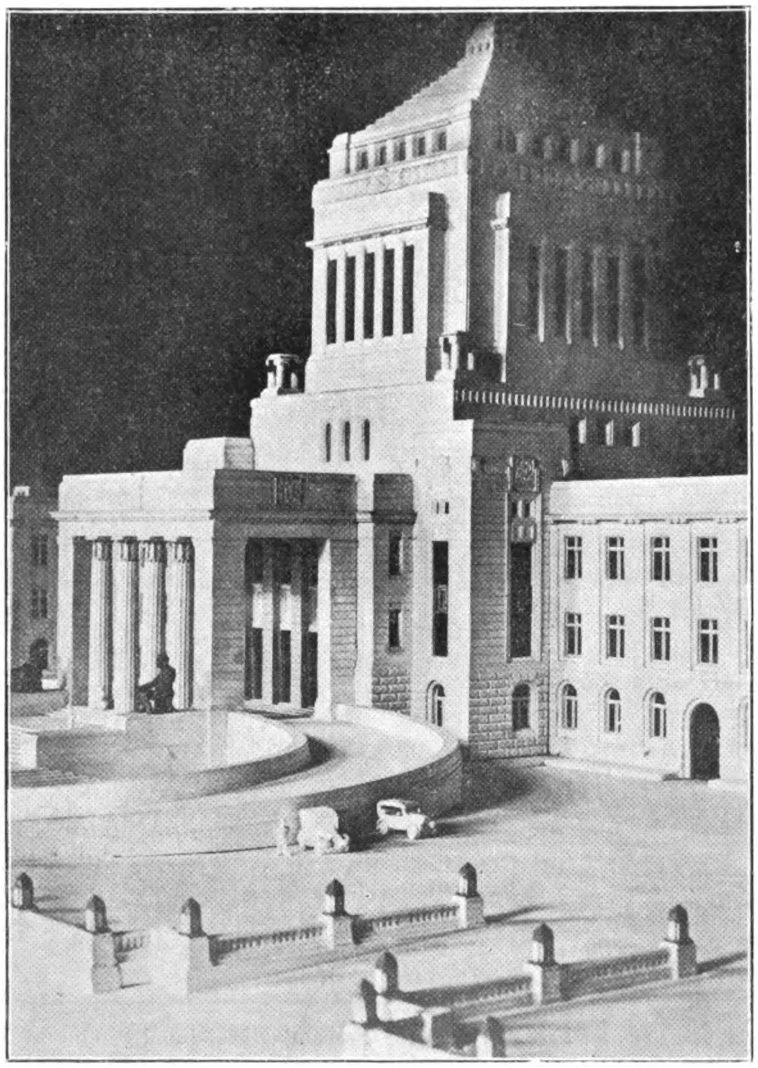


Model of Japan's New Parliament House

Japan's New Parliament Building

IN keeping with her new importance as a great world power, Japan is busily engaged in transforming her quaint medieval capital into a modern city beautiful. The architectural monstrosities of a bygone age, foisted on the Japanese by foreign architects are giving place to more dignified and enduring structures. The use of concrete and steel has permitted the erection of imposing buildings in a land subject to earthquakes, which, in addition to frequent conflagrations, has limited the size of Japanese houses to one or two stories. A Greater Tokyo is being planned, in which steel and concrete will supersede the old wooden and stucco houses with thin black tiled roofs. Foremost amongst the many new public and private buildings will be the new parliament house, a magnificent pile of steel and concrete faced with cut granite which will arise from the highest ground in the centre of the capital near the imperial palace.

The final details for the construction of this building were completed in April, and work on the foundations is now progressing. The government architects will supervise much of the work, calling for tenders for special features only. This structure calls for the expenditure of Y.23,000,000 spread over a period of seven years.



Japan's New Parliament House: The Central Tower and Main Entrance

Covering an area of 14,984 sq. yards, the building will be set in the middle of a park of 76,680 sq. yards, and will have a total floor area of 59,960 sq. yards. Exclusive of the basement there will be three stories, with a frontal of 1,128 feet and a width of 368 feet. The height from the ground to the roof will be 86 feet and 261 feet to the top of the central tower. There will be 361 rooms, with the area for the house of peers and the house of representatives about evenly divided, each calling for 840 square yards of office area. The house of peers will seat 500 members with provision for 580 and a gallery capacity of 968 seats. The house of representatives will also seat 500 with provision for 630 and have a gallery seating, 1,137 presons. The foundations will be built upon piles and concrete pedestals, while the structure will be of steel with brick walls faced with cut granite, with reinforced concrete floorsand roof.

Electrical Opportunities in Indo-Chine

THE larger industrial establishments of Indo-Chine and many of the cities and towns are waking up to the necessity of electrifying their motive power, and have already installed or have under projection the erection of central stations, which in the main are turbo-alternating plants of 1,200 to 2,000 H.P. Five central stations of large capacity are already operating in Haiphong, Hanoi, Saigon and Benthuy, while two additional plants are being installed at Hanoi for supplying power for irrigating pumps in that district. It is expected that several similar plants will follow these, while numerous projects are on the tapis for smaller isolated plants operated by gas or steam. Not only are such plants highly essential for lighting, but the climate calls for thousands of fans and current to operate small ice plants and minor industries in the numerous towns and villages.

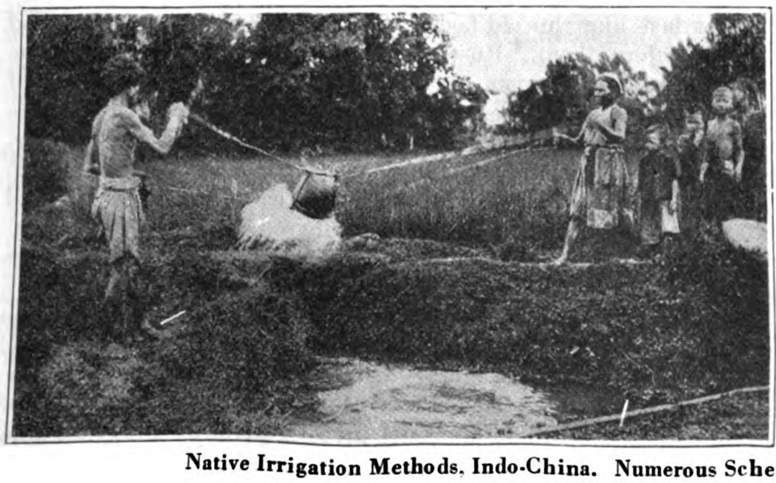
Tongking, Hanoi, Rue Paul Bert

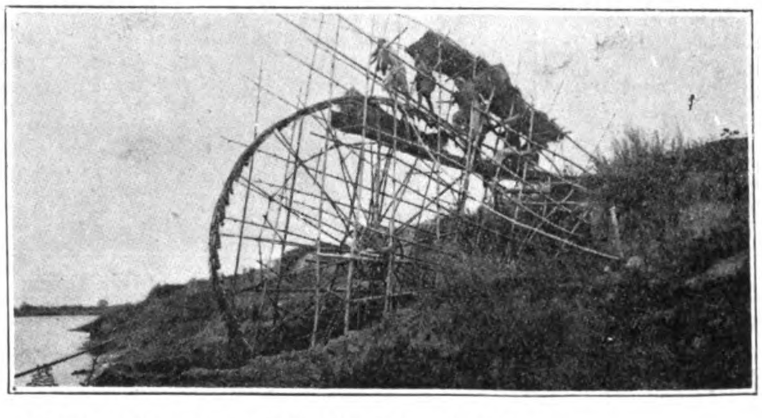
Beautiful Roads in the Environs from Saigon

In Tongking, central plants are now in operation in Hanoi, Haiphong, Hongay, Doson, Bac-Ninh and Laokay with one under construction at Namdinh and projects for Tuyen-Quang, Langson and other places. In Annam, plants are in operation at Vinh, Benthuy, and Hue, with projects for Tourane and Dalat. The towns of Quinhone, Faifoo, Quangngai and Thanhhoa also require plants. In Cochin-Chine, in addition to the 6,000 H.P. central station at Saigon, there are plants in operation in Mytho, Cantho, Sadec, Chaudoc and Longxuyen. Over one hundred smaller prosperous cities and towns await illumination. In Cambodia, two central stations are in operation in Pnom-Penh and Battambang while the towns of Kompong Tjame and Angkor are sadly in need of light. In far distant Laos, small plants are operating in the two capitals, Vientiane and Luang Prabang, which are inadequate to meet the demand and are to be enlarged.

The electric tramways of Hanoi with their 27 kilometers of lines are insufficient to meet the needs of traffic and the natives are clamoring for extensions into the surrounding country in order to escape the uncomfortable and high-priced system of auto-busses. These suburban lines call for an additional 70 kilometers in the Hanoi district alone. In addition, projects are being studied for tramways to connect Haiphong with Kien-An and Doson, a distance of 28 kilometers, and with Qunag-yen and Hongay, a distance of 82 kilometers.

In Annam, tramways are required to connect Vihn with Benthuy, 6 to 8 kilometers, Tourane with Faifoo, 24 kilometers, and Quinhone with Bihn-Dinh, 20 kilometers. Above all, Cochin-Chine requires adequate means of transport. Saigon is electrifying a scheme of 20 kilometers of tramways, but there is urgent need of at least 30 additional kilometers of urban and 50 kilometers of suburban lines. As to the rest of Cochin-Chine, 400 kilometers would not be sufficient for a prosperous people who desire to move around with comfort and willing to pay for it. As an instance of the volume of traffic in this province it is pointed out that between the two small towns of Cantho and Soctrang, separated by 60 kilometers of road, there is a daily service of 50 autos, which charge at least three times as much as would be necessary to enable a





Native Irrigation Methods, Indo-China. Numerous Schemes are Projected to Operate Irrigating Pumps by Electricity

tramway to pay dividends. In the town of Pnom-Penh in Cambodia thousands of farmers come and go to the market packed liked sardines in old rickety autos or native carts.

Aside, however, from the great demand for electric power for lighting and tramways, irrigation requirements offer the most profitable returns from the installation of central plants. In

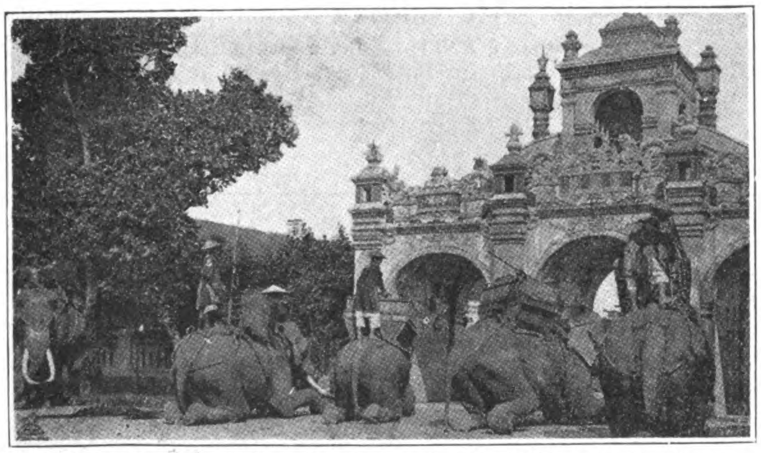
Cambodia Royal Palace, Pnom Penh

Cochin-Chine, plans are being studied to establish these electric irrigation systems along the canals and rivers in connection with tramways. One such installation is about to be carried out at Phung-Nhiep, while in Tongking and North Annam two schemes of electric pumping for irrigation will shortly be commenced. One of these schemes will irrigate 15,000 and the other 100,000 hectares.

In addition, there are many mines in Tongking requiring electrical plants. Some are already equipped, such as the Pia-Ouac tin and wolfram mines with 750 H.P. and the coal mines at Hongay, while plants aggregating 2,000 H.P. are being installed in the mines at Lang-Hit and Phan-Me.

The clamor of public opinion has moved the Indo-Chine railway authorities to equip their coaches with electric lighting and ventilators. In addition, electric tramways, funicular or aerial, are projected for the mountain stations of Tamdao, Popokvil, Dalat, Chapa, etc.

Hydro-electric plants are still rare in Indo-Chine notwithstanding the enormous amount of water-power existing in the country. This is due, however, to the great distance of the water power from the industrial centres and to the fact that in Saigon and Haiphong coal is both excellent and cheap. However, the Tintouc (Pin-Ouac) wolfram mines are installing a hydro-electric plant of 750 H.P. and another installation of 14,000 H.P. is projected in Tongking for



Elephants Kneeling before the Gate to the Royal Palace at Hue Annam

the manufacture of sulphate of ammonia and still another of 2,500 H.P. at Lang-Bian for the illumination and other requirements of the mountain station of Dalat. For a long time studies have been made for the erection of a 40,000 H.P. hydro-electric plant near Saigon, utilizing the cataracts and rapids of the Donai River. One of the rapids of the Mekong at Khone has a minimum volume of 1,000 cubic meters of water per second with a head of 18 meters and will confer, when the day comes to exploit it, a great importance to that district.

Harbor Work at Chefoo Progresses Steadily

The breakwater for Chefoo harbor, in accordance with plans to make this North China port thoroughly modern in every respect, was completed by the end of 1920. Work on the mole went forward steadily, according to the engineer-in-chief of the Chefoo harbor improvement commission, Mr. C. Rickard, from March of last year.

The breakwater is approximately at its full height and protected by heavy rubble on the slopes for a length of about 3,200 feet. A total length of 17,000 feet of parapet wall has been built. Work on the mole to December involved the depositing of 194,000 cubic yards of sand, 167,000 square yards of brush wood zinkstucks, and 64,500 tons of rubble in the foundations and lower part and nearly 173,000 tons of rubble in the upper part.

The reinforced concrete caisson for east end of the quay was sunk successfully during the summer; it has been filled with concrete and the large masonry blocks in the quay wall and the wing walls have been put in place. About one-half of the masonry superstructure remains to be constructed.

Expenditure on work for the year amount to Chefoo Taels 645,942. This port work promises to restore to Chefoo something of its old importance as an outlet for Shantung. It is the only harbor not controlled by Japan. Its chief difficulty is the lack of railway communication with the interior. The Chinese gentry are still attempting to finance the Weihsien railroad to be independent of Japanese-controlled lines in a large part and greatly increase China's economic hold on Shantung, backed by the Peking government.

Wallace Cured Sick Steel

An incident is related of Henry C. Wallace, the new American secretary of agriculture, which identifies him with the iron and steel business in an interesting way.

Several years ago the readers of the farm publication of which he is editor made complaint of rapidly rusting fence wire. Henry C. Wallace put their problem up to the agriculture department, the same as he would have done in case an inquiry had come regarding a mysterious disease among livestock. Instead of a sick hog, it was a case of sick steel.

The readers wanted to know why the wire fences they put up did not last like the old-fashioned wire fences their fathers had put up before them. Rust seemed to be playing havoc. The government metallurgists at Washington asked for specimens of old fence wire which has resisted corrosion, along with samples of the new fence wire which had rusted so rapidly, for the purpose of comparison and analysis.

It was found that modern rapid practice in steel making had left the metal full of impurities, as compared with the old-fashioned hand-made iron, and that the presence of these impurities caused the rapid corrosion of the new fence wire.

The department of agriculture made a notable contribution to the science of metallurgy in this discovery of the reason why steel and iron rust, and it is a matter of interest that Henry C. Wallace, who sent the first samples of rusted fence wire to Washington and thereby opened up this important investigation, is to-day heading the department.

The Mines and Minerals of Yunnan

South China

By J. COGGIN BROWN, O.B.E., D.Sc., M. Inst. M.M., F.G.S.

Geological Survey of India

The author gives a description of the mineral resources of Yunnan, the most south-westerly of the Chinese Provinces, adjoining Burma and Tongking

From the Mining Magazine

Concluded

FUTURE OF GOLD MINING.—Regarding the future possibilities of alluvial or lode-gold mining in Yunnan or about its borders, all that can be said is that deposits exist which deserve careful testing. The Yangtze, Mekong, Salween, Shweli, and their tributaries all carry gold. In this way they do not differ from the Irrawaddy and its branches, which may be regarded as members of the same group of rivers, as far as their upper reaches go. The Irrawaddy is the only one of the group in which long and careful tests have been made. There gold dredges worked for years on this river above Myitkyina, and in 1918 ceased operations, which apparently could not be carried on profitably. Whether the alluvial deposits of the other rivers are richer or not is unknown. The Chinese are the most frugal race in the world and too many earlier writers have been led to dream of El Dorados, because they have been a group of men eking out a miserable existence on lean gold deposits which no one else would touch. However, richer deposits may occur, but they will have to be sought for and investigated.

The most promising region for the occurrence of lode gold appears to me to be in the basins of the Yalung and its tributary the Litang in Ssuch'uan.

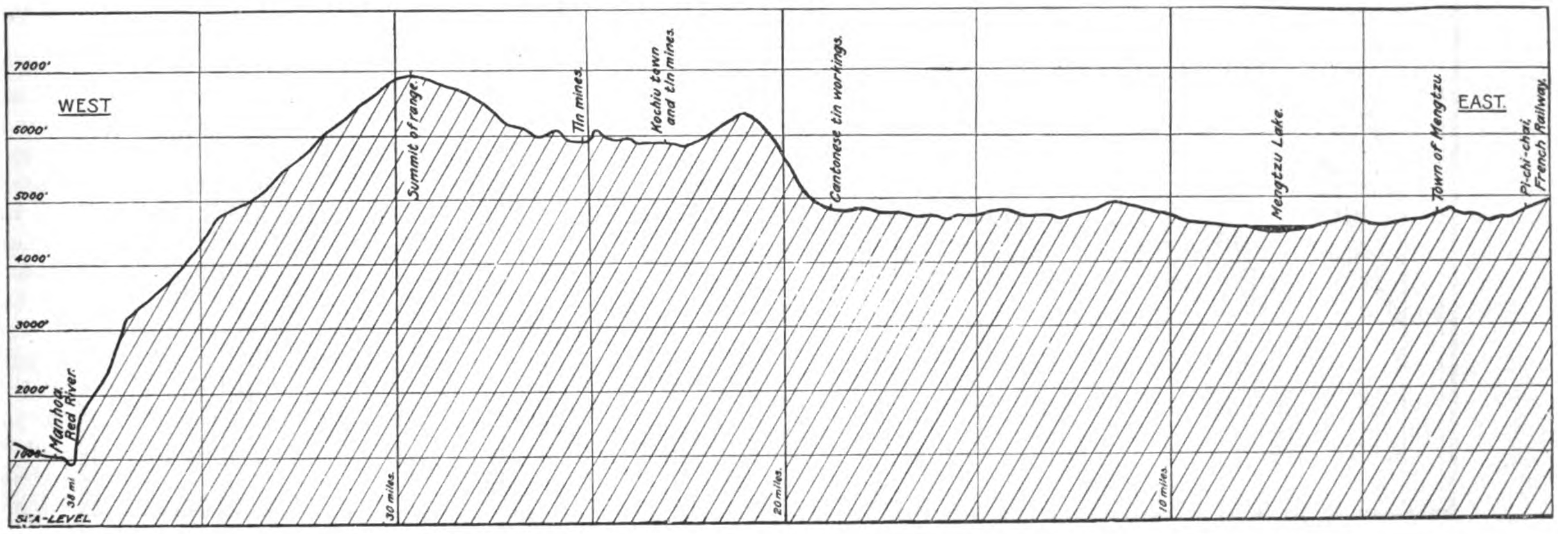
LIGNITE.—Lake basins filled with lacustrine and fluvio-lacustrine deposits of late pliocene and recent ages abound throughout Yunnan. To these deposits I have given the name "Nan Tien Series." Bands of lignite often occur in them and are sometimes mined for local purposes. The lignites are similar in composition and origin to those which occur in the basins filled with Tertiary silts in various parts of the northern Shan states of Burma. One of these Shan coalfields is now being opened up by the Burma Corporation. I have not seen any seams in Yunnan which approach the Shan ones in thickness or regularity.

The following assays illustrate the similarity in composition of these brown coals:

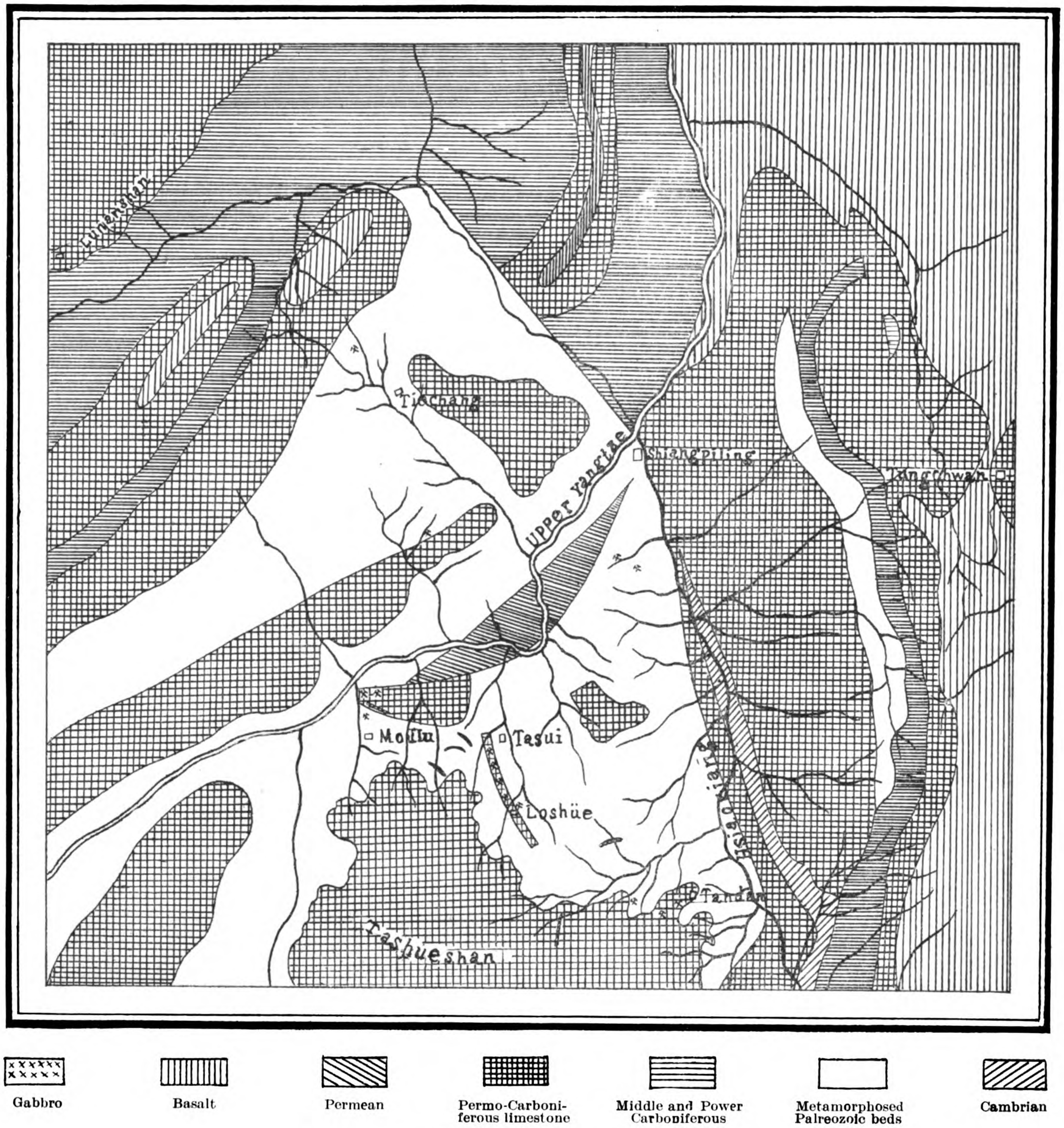
Locality.	Moisture.	Volatile Matter.	Fixed Carbon.	Ash.	Remarks.
	%	%	%	%	
Nan Tien, Western Yunnan ...	15.86	34.00	20.33	29.81	Mean of 2 assays
Eastern Yunnan...	19.94	34.39	27.72	17.95	,, ,, 7 ,,
North Shan States	16.55	36.62	35.11	11.72	,, ,, 18 ,,

TRUE COALS.—The earlier French writers established the existence of coal seams of triassic and middle carboniferous age. The former occur mainly in the south-east of the province, and are of upper and lower triassic age respectively, though there is one important field in Central Yunnan which probably stretches from the vicinity of Yunnan Hsien northward into the Yangtze valley. In both regions it is mined and burnt by the local inhabitants. The Triassic coal of the Yangtze valley is of excellent quality; low in ash and moisture, it has a high calorific value, burns with a brilliant flame, and yields a coke of very good appearance. I have examined also most of the important coal-bearing localities of the middle carboniferous in eastern Yunnan. They yield a semi-bituminous coal which cokes well, and the best seams are probably preferable for steam-raising purposes to the triassic coals.

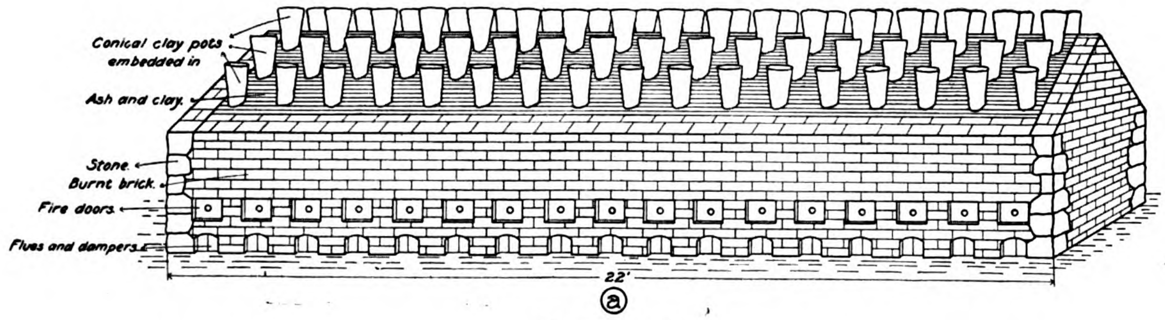
Yunnan coal has a future before it in the local market for metallurgical operations, domestic purposes, industrial uses, and as a fuel for the railways. I do not think that it will ever obtain a large market beyond the frontiers, owing to the land-locked position of the province, forming as it does the western hinterland of continental China, and also to the hold which Japanese, Indian, Australian and African coals have in the markets of the Far East in normal times.



Section from Pichichai Through Tin District to Manhoa

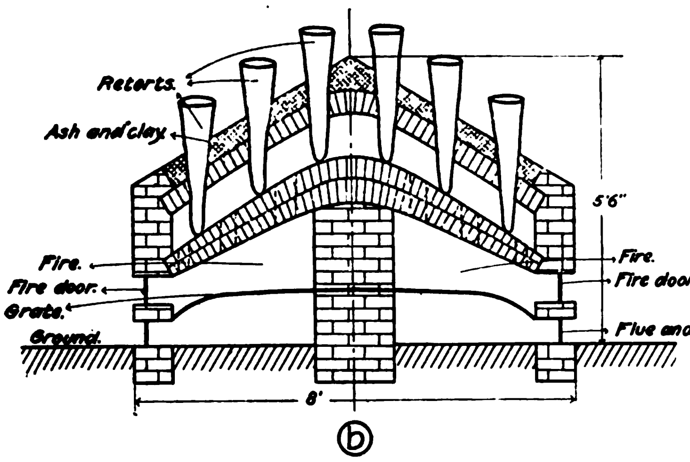


SPELTER FURNACE AT O-YIN-SHAN, YUNNAN.



GENERAL VIEW.

IRON.—Iron ores are well distributed throughout Yunnan, and while none of the deposits appear to be extensive, or in any way comparable with, say, those of the crystalline rocks of the Indian Peninsula, yet iron-smelting is a settled industry, and all the large centres of population have their somewhat small needs of cast iron, wrought iron, and steel supplied from works in the same regions. Again, where any unusual demand has arisen, as in the case of cast-iron pans for the brine-boiling on the salt fields, there is generally an ironstone mine, blast-furnace, and foundry not far away. Yungch'ang Fu has its mines at P'ingtai in the



(b)
SECTION.

Tatienpa valley, two stages to the east of the city. Tengyüeh is supplied from the Tient'aungkuan, a district which lies to the north. Yunnan Fu, the capital, has its requirements met from the Yimen Hsien area; the cities of the south-east from the Hsio Hsien neighborhood, and so on.

The hemispherical cast-iron pans of Yunnan are much appreciated by the Chinese everywhere, and may be found in all the bazaars of Upper Burma; while the thousands of mules engaged in carrying the trans-frontier trade are always shod with Yunnan-made shoes and nails, and every caravan carries a large stock of these excellent articles.

From Têngyüeh to Yingpankai, the centre of the iron industry of Tient'aungkuan, is a three days' journey. The stages are at Machankai, 14 miles; Kutungkai, 23 miles; and Yingpankai, 34 miles. The mines are situated at the head of a small valley about four miles from the village, which has an elevation of 6,000-ft. above sea-level. A fine-grained granite crops out in the vicinity, but geological observations were made difficult by a thick soil cap. There were a number of workings descending into a large mass of brown hematite. I traced the outcrop on the surface for 60-ft. without seeing its limits. It strikes a few degrees east of north and is from 10- to 15-ft. wide. The ore was carried down to Yingpankai, where there were three furnaces, or to Malipa, three miles further north, where there were five. The furnace was of massive stone work, the back and sides forming a rough semi-circle. It was lined with a refractory white clay. It differed essentially from the high blast-furnaces used for smelting iron ores in other parts of Yunnan, as it was only 7- or 8-ft. high at the back. The blast was let in by a tuyere which entered the lower portion of the back wall. The blower, 7- or 8-ft. long and 1½ ft. in diameter, was worked by a water turbine. The tapping hole was also used as the slag outlet until the hearth filled with molten metal. In front of the furnace a stone-paved incline sloped down to a tank filled with water, used for quenching the hot material at the end of the blow. Three rectangular holes in the upper part served as places where long iron rods could be introduced to prevent clogging. Charcoal and ore were added from time to time during the 24 hours which the smelting operation took. Two grades of material were produced, the first in the form of flat cakes of pig iron, and the second made up of the finely-divided iron mixed with a good deal of charcoal. The latter was worked up in forges into horse-shoes, nails, ploughshares, etc. The cakes of pig iron were used to make cast-iron pans. The furnace used for melting the metal was a small, round-bottomed, tilting blast-furnace about 4- or 5-ft. high, made of thick clay work, and strongly bound with iron bands. The molten metal was tapped into a ladle, and then poured into the moulds. The iron pans produced in this way were of beautiful workmanship and varied in diameter from 10 to 30 inches.

Iron is smelted from ores obtained at several places in the vicinity of Shach'iao, a small village four miles to the north-west of Chennan Chou. At Yecho Ho I examined a blast-furnace 25-ft. high, and 6- or 7-ft. across at its widest portion, narrowing to 3-ft. at the hearth and top. It was built of heavy stonework enclosed in beams held together by cross-pieces, and was lined with clay. The tuyere was cut from a block of hard sandstone. The blast was produced by the usual cylindrical blower worked by a turbine, on the principle of the vertical axled water wheels commonly used in the Himalaya for the supply of power to corn mills. The ores of this region are rather soft hematites derived from ferruginous horizons in the red beds series.

The P'ingtai mines and smelters lie two stages to the east of Yungch'ang Fu. The ores are obtained from horizons in the Palæozoic limestones of the vicinity, and are treated in high blast-furnaces of an untapering type. The cast iron is worked up into bars of wrought iron for general smithy purposes, and there is also a foundry for casting iron pans.

In the Yuanmou Hsien district, I heard of a mine at Yi-ch'ang, five miles from Lungkai, a village on the main road between Makai and Manshan.

There is an iron-stone mine at Laopeya, one stage from Têngch'uan Chou. Cast iron is made on the spot and turned into pans for use in the brine-boiling centres around Yunlung Chou.

Huili Chou is supplied with iron from Ilang Ho, two stages west of the city, and also from a mine and smelter at Laopingwan.

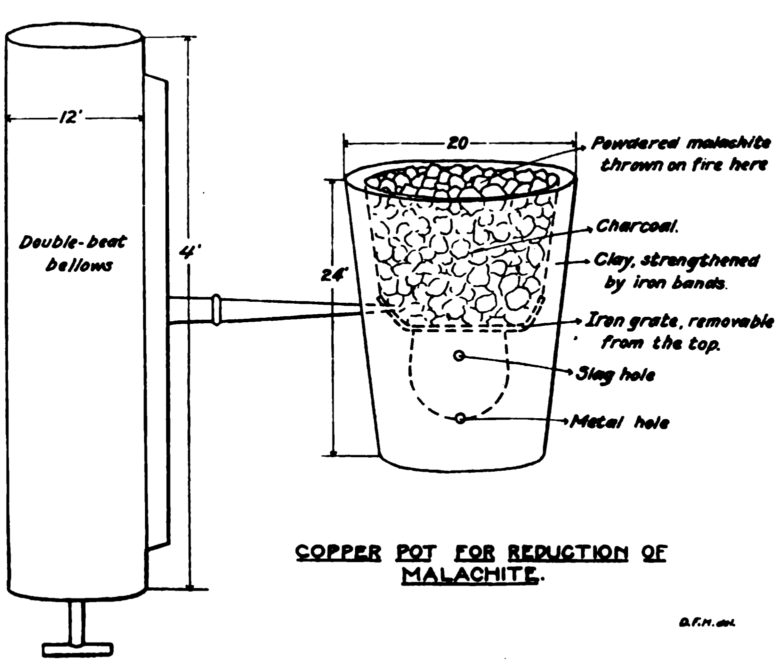
Near T'iehch'ang, a village four or five miles to the north-east of Yungp'ing Hsien, I found old iron slag heaps, but could obtain no information as to when they were made.

Iron ores are mined and cast-iron pans made at Lutzu, two stages north-east of Lufêng Hsien. These pans are used in the salt-fields around Lanching.

Hematite ores occur in bands in the Kaoliang slates between Mosoying and Yimen Hsien, and it is said that there is a large mine at Yanghsingch'uan, a village on this route.

If Chinese evidence may be relied upon, one of the more important iron-producing regions of Yunnan is located around Hsishankai, which lies one stage north-west of Tatsangkai, a large village near the head of the Mênghua T'ing valley, and about half-way between that city and Tali Fu. I was informed that the mines work all the year round, that they find employment for between 300 and 400 men, and that they supply the cities of Mênghua T'ing, Tali Fu, and Lichiang Fu with the metal.

There are no iron ore deposits in Yunnan that I am aware of at all comparable in extent with those of the old crystalline rocks of India or Indo-China, and as the local demand is a small one, and not likely to increase very greatly, a large iron business would have to depend for its success on trans-frontier trade. The geographical position of Yunnan would make freight charges so



COPPER POT FOR REDUCTION OF MALACHITE.

high that even with railway transport available in all directions of outlet the local products would find it next to impossible to compete with French, Chinese, Japanese and Indian manufactures in the Far East, and perhaps with European and American products landed on the coasts there. That a modern blast-furnace plant can be successfully operated in China is, of course, perfectly well known, but a situation such as the Hankow works enjoy does not exist in Yunnan. At the same time there is very considerable room for improvement in the local industry, but I am persuaded that this is a matter which may well be left to the small Chinese capitalist. Future progress in the way of systematic mining, more profitable utilization of the ores, and the closer association of the smelters with the coalfields of the province, if they come at all, will probably come through him.

SALT.—The salt-producing beds of Yunnan occur toward the base of the red beds series of permo-triassic age. This series covers a great expanse of country, and the chief salt-manufacturing centres are situated in places where the lower horizons have been favorably exposed. The following prefectures all contain districts from which salt is obtained, and are arranged in order of relative importance :—

(1) Chuhs'uing Fu.—Production 22,100 tons per annum from the districts of T'ingyuan Hsien, Yaochou, and Kuangtung Hsien ; supplies the areas around the capital and towns as far south as K'aihua Fu and Mêngtzu Hsien, with an estimated population of five and a half millions.

(2) Puerh Fu.—Production 6,500 tons per annum from the districts of Chenyuan T'ing, Weiyuan T'ing and Puerh Fu itself ; supplies the south and south-western part of the province, both Chinese and aboriginal, estimated at one million six hundred thousand.

(3) Tali Fu.—Production 3,600 tons per annum from the district of Yunlung Chou ; supplies the towns of the Tali Fu, Yungch'ang Fu and Shunning Fu prefectures, estimated at nine hundred thousand.

(4) Lichiang Fu.—Production 1,400 tons per annum from the district of Hoch'ing Chou ; supplies the north-western corner of the province, estimated at three hundred and seventy-five thousand.

(5) Ch'engchiang Fu.—Production 1,300 tons per annum, from the district of Chingtung T'ing ; supplies the surrounding country, estimated population three hundred and fifty thousand.

(6) Yunnan Fu.—Production 600 tons per annum, from the district of Anning Chou ; supplies certain areas to the south, including Chiangch'uan Hsien and Hsinhsing Chou, which have an estimated population of one hundred and fifty thousand.

(7) Ch'uching Fu.—Production 400 tons per annum, from the Wut'ing Chou district ; supplies the country around this town, with an estimated population of one hundred thousand.

This grouping follows more or less approximately the one adopted by the provincial salt administration. A broader classification based on geological and geographical grounds is the following :—

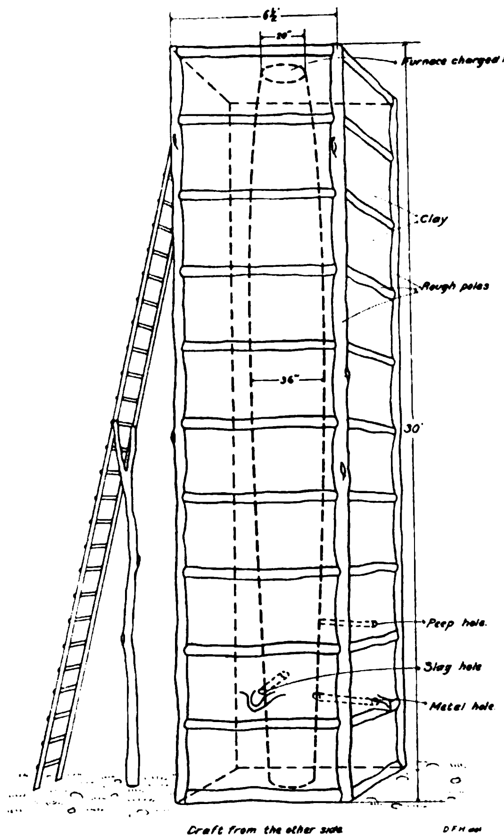
(1) The salt fields of north-western Yunnan, including those of the Tali Fu and Lichiang Fu prefectures.

(2) The salt fields of Central Yunnan, including those of the Chuhs'uing Fu, Yunnan Fu and Ch'uching Fu prefectures.

(3) The salt fields of south-western Yunnan, including those of the Puerh Fu and Chengchiang Fu prefectures. The fields of the Chingtung district are about midway between those of Weiyuan T'ing and Tingyuan Hsien, but they are really an isolated portion of the south-western field.

It will be noted that all the salt-producing districts are east of the Mekong River. The total retail value of the 36,000 short tons of salt produced per annum in Yunnan I calculate to be about £288,000, and the total annual revenue derived by the government at the time of my travels in the country about £170.500. It will be observed that the 36,000 tons of salt is consumed by a population of 9 millions, but it has been stated already that the population of Yunnan is about 11 millions. The question may be asked, where do the remaining 2 millions obtain their salt supplies from ? In this connection it may be mentioned that the north-eastern districts are supplied from Ssu-ch'uan, that there are brine wells at Yakalo, a town five miles outside the Yunnan border in the extreme north-western corner of the province, and that there is a certain amount of illicit manufacture and contraband trade in salt in other regions. Salt is also made from brine at Yenching and Yentang in the Yenyuan Hsien district of Ssu-ch'uan. These places are within short distances of the northern border of Yunnan in the Yungpei T'ing district.

BLAST FURNACE FOR IRON, TONGHAI, YUNNAN.



SALT IN THE TINGYUAN HSIEN DISTRICT.—The salt-producing localities in this district are Lanching, Heiching and Houching. At the former the salt is made entirely from the brine of five underground wells. A steep incline is driven down into the salt-bearing strata, terminating at the bottom in a well 60- or 80-ft. deep with a diameter of 5- or 6-ft. The salt is dissolved out by the water in the rocks, and, percolating into the well, is raised in a carrier of untanned buffalo skin worked on a primitive windlass, manipulated by four men. On reaching the top the liquid is emptied into a small tank excavated out of the rock. From here it is pumped to the surface as required. The pumps are made of hollow bamboos, from 4- to 6-in. in diameter, and from 8- to 10-ft. long, fitted with a piston made from a stick with a T-piece handle, to the other end of which a loosely-fitting plunger of skin packed with straw is attached. This is inserted inside the bamboo, which is open at both ends, and has one end dipping into the brine tank. A man sitting astride fills the bamboo with brine by means of a hand baler and then quickly works the handle up and down : the brine is sucked up and flows out at the upper open end into a small pool built at the side of the incline. From this pool another pump of the same kind lifts it a little higher, and the operation is repeated until the surface is reached. The brine now flows by gravitation in open wooden boxes to the storage tanks, which are generally sunk in the ground near the evaporating sheds. It is ladled out as required and carried in wooden pails to the sheds. These usually contain four furnaces, each fitted with 20 or 30 hemispherical iron pans varying from 2- to 4-ft. in diameter. They are supported on iron bars covered with brickwork. The entire top of the furnace is filled in with brickwork up to the level of the tops of the pans.

The brine is systematically treated ; going first into a large central pan, it is heated, and then filtered, while hot, through cloth into a second pan. As it becomes more concentrated, it is transferred again and again, until solid cakes of salt are formed. When the furnace, which is heated with brushwood, is cool, the salt is taken from the pans, cleaned and weighed. At intervals of a month or so the brick and clay work of the furnace is replaced, the old material broken up and leached with water to extract the salt which it contains.

Heiching is about four miles to the north-east of Lanching and the small town is built around its eight brine wells. Most of these are underground, similar to those in Lanching, though there are others which are open to the surface. The brine is won and treated by methods identical with those just described. Houching is 12 miles to the south-east of Heiching, and it possesses several brine wells of the same type, and in addition three mines from which rock salt is won. The salt occurs in patches and strings in a hard red sandstone of considerable but unknown thickness, only about 20-ft. of it being mined. The sandstone is attacked in a methodical manner by driving large galleries into it, only sufficiently large pillars being left to support the roof. The rock containing the salt is smashed up and then leached with water, the brine being boiled down in the usual way. Some of the furnaces in Houching are much larger than those in the other places, and are built to take over 40 small pans. The salt from all the localities is taken to the government stores after being cleaned and weighed. It is there officially stamped with red paint, which, covering practically the whole surface of the mass, would show at once any attempt at pilfering by breaking off small pieces.

Salt in the Yunlung Chou District.—All the salt which this district produces is made from well brine. There are no salt mines. The wells are located as follows: Paofungching, in the city itself; Shihmenching, Tienerhching, Taching and Shangching, in a valley six miles north of the town ; Lotenching, Luching and Shwuntanching in the unsurveyed area to the north of Yunlung Chou. At some of these places the brine is not evaporated to complete dryness, but the salt is removed from the pan while it is still wet, and firmly pressed into small cylindrical moulds, so that instead of the large masses made on other fields, which form a heavy load for a man, the salt comes on the market in the shape of small cylinders, each of about 3-lb. in weight.

Salt in the Weiyuan T'ing District.—The geology of this salt field is much the same as the others, the mineral coming from a low horizon of the red beds series. At Hsiangyenching there are two salt mines and two underground brine wells of the usual type with bamboo pumps. The boiling-down process is identical with that of the other fields. If anything, conditions are dirtier and more insanitary than elsewhere. The furnace houses are the homes of large families, and the gutters carrying the brine run along the village streets alongside the sewers. Hotitang has two salt mines which were opened about 1899. There are several other salt mines and brine wells in this region, but I did not succeed in obtaining a list of them.

Salt in the Puerh Fu District.—There are several salt-producing centres in this district, but I only visited one at Mohei. It is probably the largest in this part of Yunnan. Rock salt is mined and brine is obtained from wells. There are 28 evaporating sheds, and each furnace carries 24 pans in 6 rows of 4 each. About 300 miners and coolies are employed.

The Brine Wells of Anning Chou.—This place is a small town one day to the west of the capital. Around it there is a considerable development of massive red sandstones and other rocks similar to those of the more important saliferous localities. The brine is very weak, and before being boiled down is concentrated in the following manner:—It is led away in long open channels to shallow pools which expose as much of the liquid as possible and so favor evaporation. Beds of dried earth are arranged near these pools, and are periodically drenched with the salt liquors, which are baled out and thrown over them. Aided by the sun and the wind, the water evaporates, and the operation is repeated until the earth will take up no more salt. It is then leached with water in tanks, and the dirty solution so obtained is filtered through beds of charcoal, ashes and sand, yielding a clear brine of much greater density than the original fluid from the wells. This is boiled down in the usual manner.

Future of Salt Manufacture.—One of the most serious expenses of the industry is the cost of transportation from the manufacturing centres to the area of distribution, which is at present carried on by coolies or pack mules. The introduction of railways into the province will considerably reduce this. The output of salt in Yunnan appears to be slowly declining, a state of affairs readily understood when it is remembered that there are no workings which reach the deeper-seated deposits, and that the shallow wells have been worked so actively and continuously by the Chinese as to be now in a condition verging on exhaustion. Everywhere in the province the same story is told, a story of the former prosperity and the present depression of the salt-producing centres. The output could be greatly increased by the introduction of simple machinery, especially for pumping and quick transmission of the brine. I also believe that drilling would probably reveal the existence of salt-bearing horizons of the Upper Permian in places at present unknown to the Chinese, where they are lying buried under considerable thicknesses of later Mesozoic strata. Salt is everywhere under the strictest official control and is taxed at every stage, in its manufacture, purchase, at the vats, transport, sale at the depôt and sale to the people. The importation of salt from Burma into Yunnan is prohibited by the Burma-China Convention of 1894-1897.

Mercury.—Cinnabar probably occurs in Yunnan; several specimens were shown to me at various places, though some of them may have come from the well-known mines in the neighboring province of Kueichou. At Yunlung Chou I heard of a cinnabar mine three or four days' journey away to the north, but I was not able to prove the accuracy of the information. According to Rocher, several cinnabar deposits were worked in the Tali Fu prefecture before the rebellion. He describes the roasting of the ores and the method adopted to condense the mercury vapors.

Antimony.—Stibnite occurs in the Kaihua prefecture and also about Kwangnan Fu on the borders of Kwangsi. From time to time a few hundreds of tons of antimony regulus are exported from these places through the Mêngtzu customs.

Marble.—Tali Fu marble is famous throughout China and is used for decorative purposes. The quarries are on the high mountain wall a few miles to the north-north-west of the city. A crystalline marble crops out in them. It is a fine-grained variety with irregular lines and spots of dark micas and amphiboles in a white background, which produce fantastic effects and are much appreciated by the cultured Chinese. Large quantities of the stone are still available, but the industry is controlled by the dealers rather than by the quarry owners or polishers. The stone is prepared locally, and is often stained artificially and then covered with a coating of wax to hide the deception and emphasize the color design.

Semi-Precious Stones.—The jadeite which is worked up in Têngyüeh comes entirely from the mines of the Mogaung subdivision of the Myitkyina district in Burma. The best qualities are said to be exported direct in the rough to Canton and only the second-grade stone is sent to Yunnan. Nevertheless, jade-cutting and polishing is a staple trade in Têngyüeh where every street has a lapidary's shop and lathe. Dealing in this mineral is very speculative, as the valuable apple green shades are often not visible on the outside of the boulders.

Amber ornaments are common. Most of the specimens I have examined bore the characteristic fluorescence of the Burmese material.

Turquoise ornaments are always worn by the Yunnanese Tibetans, but the stone is not of local origin.

Conclusion.—Longer accounts of the mineral deposits described in this paper may be obtained from Vol. XLVII, Pt. I, "Memoirs of the Geological Survey of India."

THE ELECTRIC SHIP

Japan Places Order with the New York Shipbuilding Company for a 20,000-ton Naval Service Ship to be Equipped with American Electric Propulsion Machinery

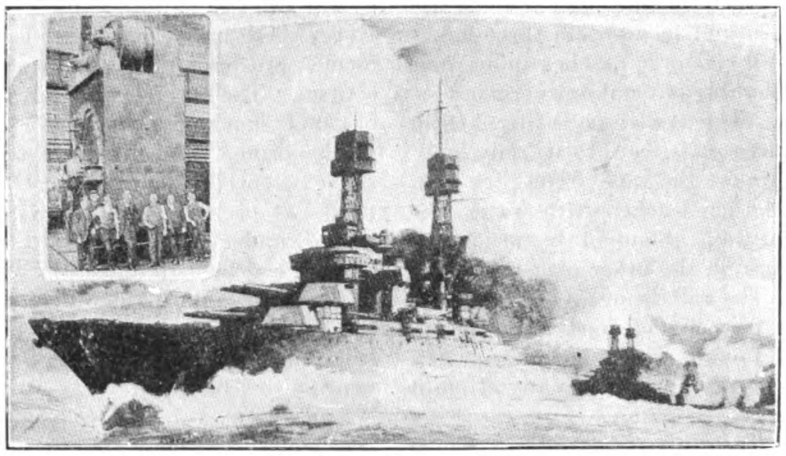
THE first naval contract placed in many years by the imperial Japanese government with an American shipyard was signed in the New York offices of the New York Shipbuilding Corporation, 120 Broadway, on May 18th by Captain M. Yokura, I.J.N., chairman of the imperial Japanese naval commission visiting the United States, on behalf of Captain K. Goto, chief of the imperial Japanese naval inspectors' office, 1 Madison Avenue.

It calls for the construction of a unique type of vessel, a combination coal and oil supply ship of 20,000 tons for fueling the various units of the Japanese navy.

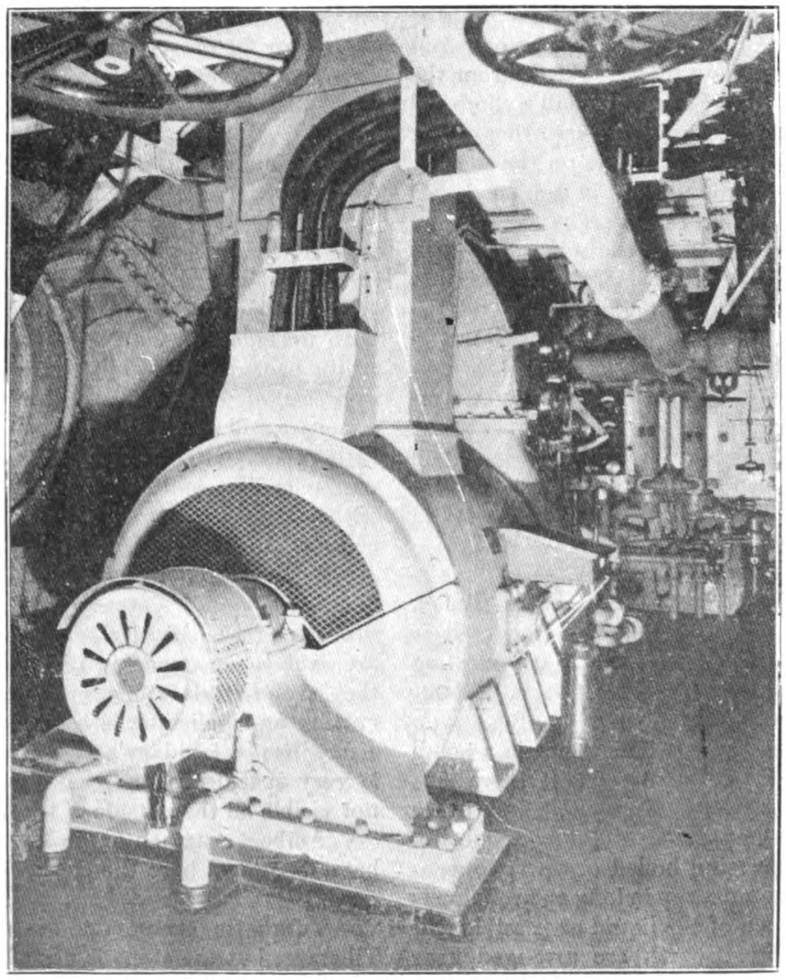
The design of the vessels which has been worked out by the New York Shipbuilding Corporation in accordance with the outlined requirements laid down by the imperial Japanese naval commission, calls for a length on the waterline of 496 feet, with a beam of sixty-seven feet. The vessel will be electrically driven, the equipment being of the newest design furnished by the General Electric Company, and will have twin screws with a total of 7,500 horsepower, which will give the ship loaded a speed of fifteen knots per hour.

The vessel will be constructed with both oil and coal bunkers, while a feature of the new craft will be the installation of an anti-torpedo boat battery.

Although the plans for this special naval vessel will not be made public, the main feature, or the electrical propulsion equipment, will conform to the most up-to-date practice in this new field of marine engineering as developed by manufacturers of American electrical machinery. Japan will get for its navy the first electrically-driven ship outside the American navy, and in going to the United States to place the order, has demonstrated anew her intense good-will at a time when powerful forces are working to bring about a rupture in the traditional friendship between the two nations.



The U.S.S. "Tennessee."
One of nine Westinghouse Electrically Equipped Battleships and Battle Cruisers, Forming the Nucleus of the New American Navy



A Typical (G.E.) Electric Engine Room
Engine Room of the All-Electric Express and Passenger Ship *Cuba*, showing Starboard Side of the Propulsion Turbine-Generator

Great strides have been made in the past few years in developing this new field of electrical engineering, in which the Westinghouse Electric & Manufacturing Co., and the General Electric Company have taken the lead. The latter company has already built geared turbine machinery for 366 ships aggregating over 2,000,000 horsepower. The company has carried on extensive experimentation with turbines, gears and electrical apparatus for ships. These studies have clearly shown that if the conditions of reversing and turbine applications are correctly allowed for, the electric drive gives a transmission efficiency practically equal to that of gears in the best condition; that it affords simple rotation and freedom from mechanical hazards; that it greatly simplifies the turbine and avoids in it dangerous temperature effects; that it affords space saving in most ships and in many cases eliminates long lines of shafting and shaft alleys; and that it is easily repaired without the use of machine shops and affords the most dependable kind of machinery which has ever been used to drive vessels.

On a par with the advances made by the General Electric Company are these made by the Westinghouse Electric & Manufacturing Company, which has also specialized on electric propulsion machinery for the American navy and mercantile marine. Contracts were recently awarded this company for the full propelling equipment of the two most powerful battle cruisers yet designed for the American navy, the "Constellation" and the "Ranger." These vessels will have a capacity of 180,000 horsepower each, and will be equally useful for scout work or taking position in the main battle line. The company has also received contracts for the propelling equipment of four great battleships: the *Tennessee*, *South Dakota*, *Montana* and *North Carolina*, and for two smaller battleships, the *Colorado* and the *Washington*. The company is furnishing for the U.S.S. *Indiana*, the

auxiliaries complete and principal parts of the propelling units; the latter being built by the navy department.

The same position established in regard to navy vessels by this company holds true for the new American merchant marine. On every sea, merchant ships equipped with Westinghouse turbines

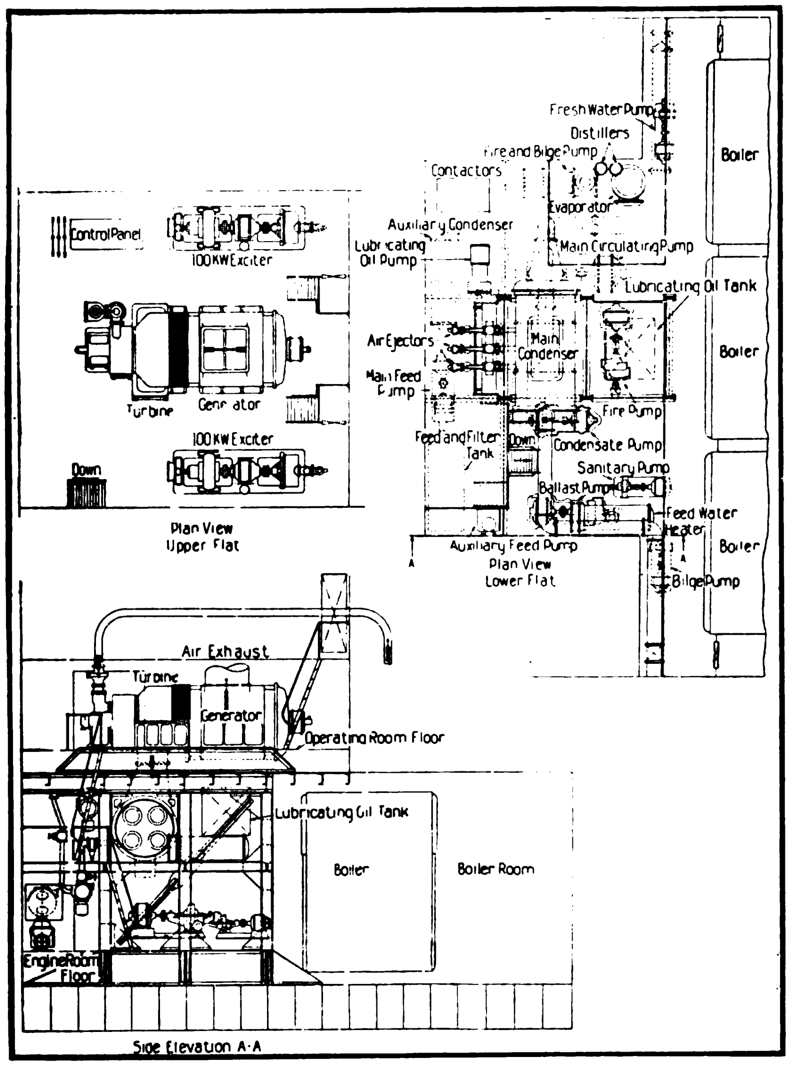


Fig. 1.—Diagram Showing the Location and Arrangement Amidship of 3,000 Shaft H.P. Turbine Generator Set and Equipment on a Vessel of Moderate Size

and reduction gears are bearing the world's commerce with speed, reliability and economy. To-day there are three hundred and twelve ships either built or building, with Westinghouse marine propelling equipment.

The great success which has attended the application of electric propulsion in the American navy and merchant marine, is sufficient reason for shipbuilders and shipowners in this section of the world to give careful study to the advantages resulting from its use in merchant steamers and tankers. *The General Electric Review* recently devoted a special number to the development of electrically-driven ships with some excellent plans showing the general layout for two distinct types. These will be of interest in connection with the mechanical end of the new Japanese naval service ship, and invite further attention to its adaptability for the equipment of steamers for general mercantile use. Mr. C. M. Rhoades of the construction department of the General Electric Company in describing the layout, construction and installation of propulsion equipment, and auxiliaries for marine drives says, that the overall efficiency and life of the main propulsion equipment is largely affected by the layout of the engine room, the construction of suitable foundations, and the proper installation of auxiliaries, piping cable and control; and this article is written to point out the most important features that should be kept in mind in arranging an engine room either for turbine-electric drive or turbine-gear drive.

In arranging machinery in the engine room there are of course several fixed conditions. As in the case of single-screw ships the motor or the turbine-gear unit has to be placed on the centre line of the ship and at an elevation to suit the propeller shaft.

There are, however, a number of auxiliaries which, while they are independent of the main unit, should be given considerable thought in connection with the service to which they are to be applied, their location, accessibility, and proper installation.

The system of turbine-electric drive has more flexibility in the placement of machinery than any other type, as the turbine generator can be placed amidship with the boilers while the motor can be placed aft. The turbine generator can be placed on the side of the centre line of the ship, or can be placed over the condenser: either arrangement has arguments in favor of it, depending on the design and class of the boat.

In cargo boats with full lines a very economical arrangement is to have the turbine generator amidships with the boiler room and the motor aft, thereby saving considerable engine-room space, shaft and shaft-alley in the cargo space.

Figs. 1 and 2 show an arrangement of a 3,000-s.h.p. engine room and motor room that would be suitable for cargo ships having the engine room amidship and the motor placed aft. Fig. 1 gives an idea of the flexibility of the turbine-electric drive arrangement, as the turbine generator can be placed well up in the ship so as to take advantage of the space over the boilers and this reduces the length of the engine room. This scheme of having the main unit elevated, which gives two or more flats, requires the minimum amount of cubical space as it not only cuts down the length of the engine room but also the width and keeps the machinery away from the ship's sides, thus giving additional bunker or fuel oil space, and in turn giving more cargo space for a given ship tonnage. There would naturally be space required back of the boilers and this could be carried to the ship's sides, in way of the engine room,

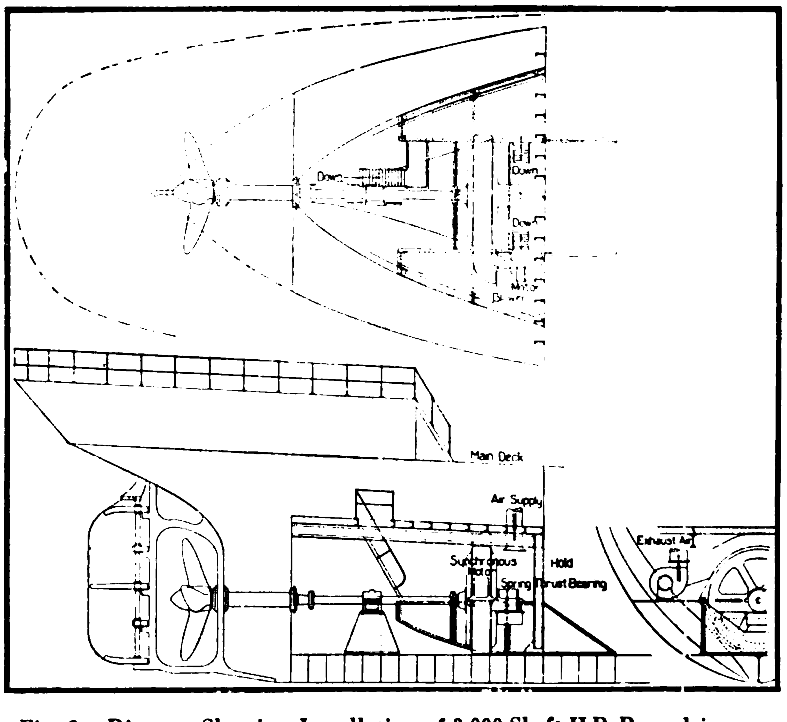


Fig. 2.—Diagram Showing Installation of 3,000 Shaft H.P. Propulsion Motor. The arrangements shown in Figs. 1 and 2 are related and apply to the same Installation

which space could readily be arranged to take care of any inlet or discharge piping from sea connections.

The engine room as shown in Fig. 1 is based on using electrically-driven auxiliaries and just enough steam units to maintain

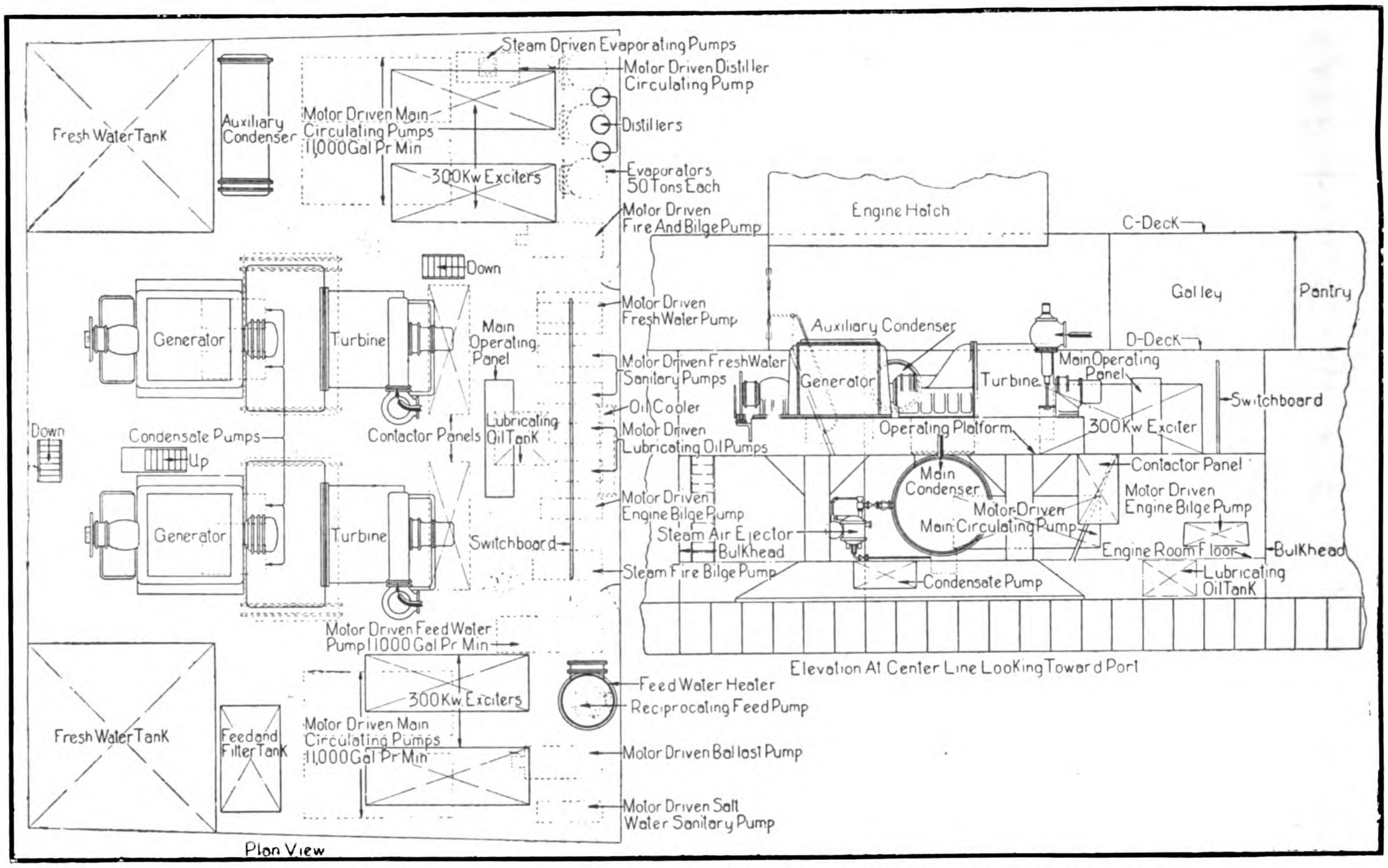


Fig. 3.—Diagram Showing Arrangement of Engine Room Amidship for 30,000 Shaft H.P. Twin Screw Vessel

a proper heat balance. The only steam-driven units are the turbine-driven exciters, the stand-by oil pump, fire and bilge pump, auxiliary boiler feed pump and the steam air ejector on the main condenser; all other auxiliaries are of the motor-driven centrifugal type.

The main turbine generator, the two auxiliary direct-current turbine generators, and the control panel are located on the upper flat convenient to the engineer on watch. The condenser is carried directly below the turbine, which is the most efficient location and

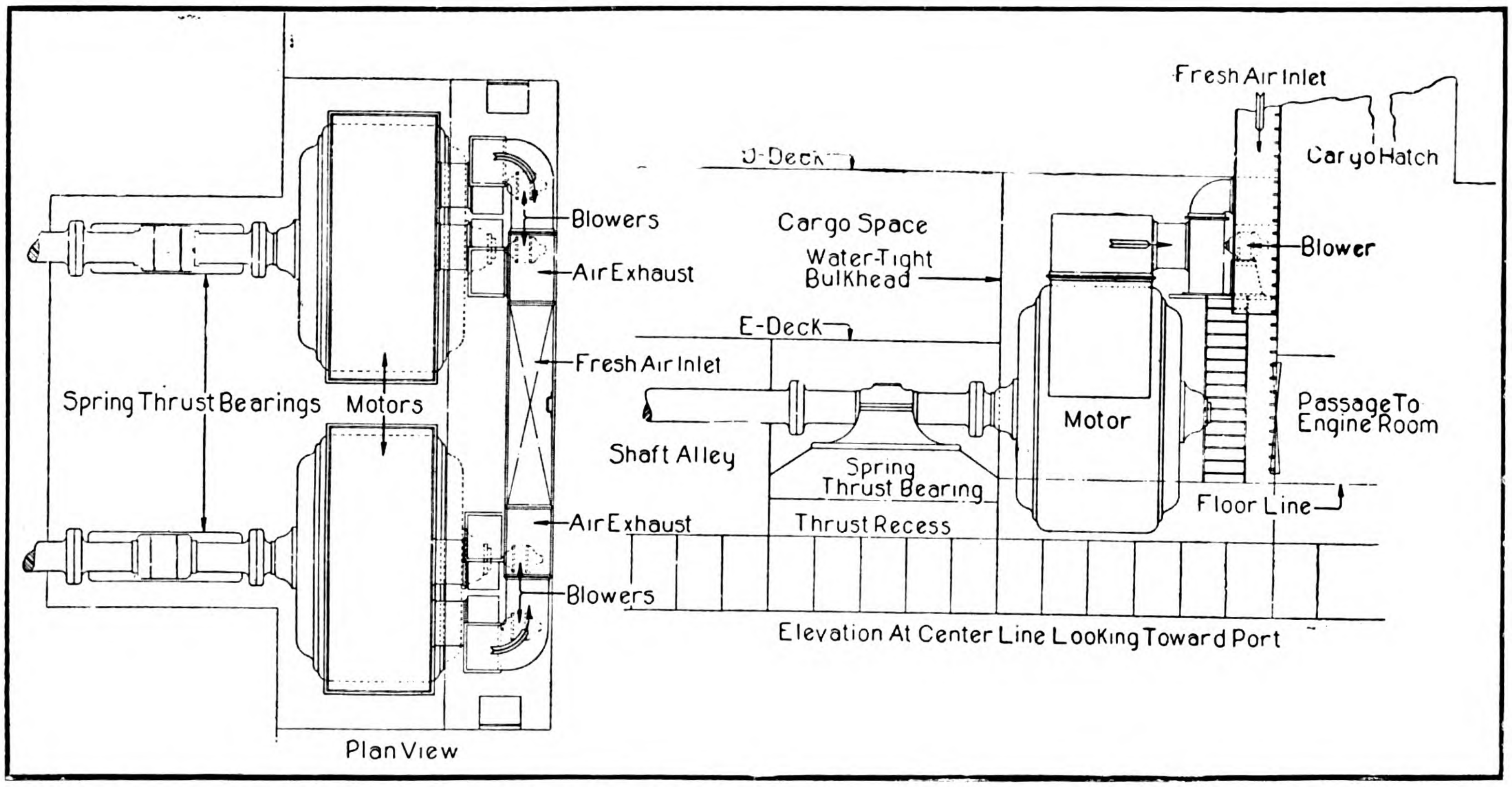


Fig. 4.—Diagram Showing Arrangement of Motor Room Aft for 30,000 Shaft H.P. Twin Screw Vessel

insures the turbine casing being drained at all times. This arrangement possesses a decided advantage over that of top exhaust units where the proper drainage of the turbine casing has been neglected and the life of the turbine unit been reduced by running turbine wheels in water.

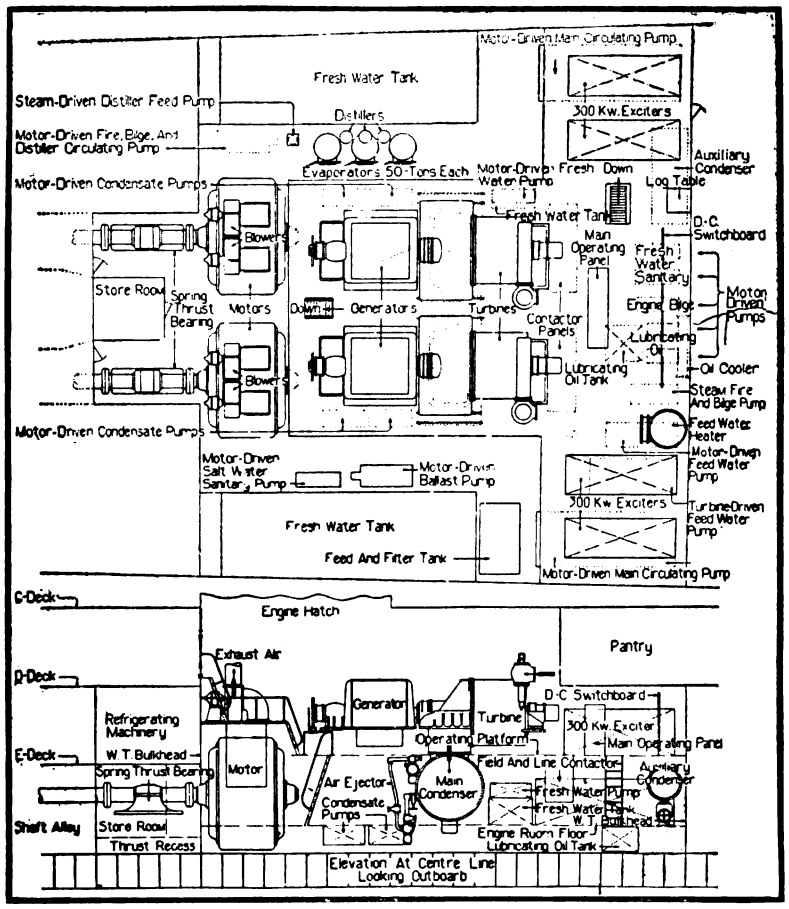


Fig. 5.—Diagram Showing the Equipment of Figs. 3 and 4 Installed in the same Compartment. This arrangement of Apparatus occupies more space and is less desirable than that represented in Figs. 3 and 4

This arrangement also eliminates the rather complicated exhaust trunk which is necessary in top exhaust units and also gives a very good distribution of weights, as the main unit and condenser are symmetrical about the central line of the ship. It is also possible to place directly beneath the operating panel, on a flat, the main contactors or switches for handling the current to the motor. These contactors can be either electrically or manually controlled from the operator's position, so that the engineer has entire control of the propulsion equipment and the main turbine at the control panel.

On the lower or engine-room floor are located all of the ship auxiliary pumps which when motor driven can be compactly arranged, as all steam and exhaust piping, which is a large factor in congesting the engine room, is eliminated.

This arrangement also lends itself to very simple and safe wiring, as all the cables can be carried underneath the turbine flat where they can be well supported and protected and led directly from the generator terminals beneath the generators to the contactors and switchboard, and all wiring to auxiliaries can be carried overhead to the motors. With due consideration to placing auxiliaries on the engine-room floor, the arrangement could be made to be very free of piping and a safe and efficient room obtained.

The motor room as shown in Fig. 2 can be placed as far aft as the lines of the ship will permit, and still have a satisfactory foundation for the motor and ample room for drawing the tail shaft. The motor shown in Fig. 2 is arranged to have the thrust taken up in the forward end of the motor.

The wiring to the motor room may be carried either in a wiring passage at one side of the ship between engine room and motor room or may be carried above decks. The decks above can be covered, leaving only the necessary openings for access ladders and for air supply and discharge ducts. To provide for the removal of a portion of the motor, a section of the bulkhead forward of the motor could be made removable and motor taken out through the cargo space and hatch.

Figs. 3, 4 and 5 show arrangements for a 30,000-s.h.p. twin-screw ship, Figs. 3 and 4 showing the engine room amidship and the motor room aft, while Fig. 5 shows the same equipment with motors in the engine room.

In both arrangements shown in Figs. 3 and 5, the main turbine generators and auxiliary generators, together with the control panel and switchboards, are all located on the upper flat convenient to the engineer on watch. The condenser and all auxiliaries are located on the engine-room floor beneath.

Practically all auxiliaries are electrically driven, there being just sufficient steam units to give the proper amount of exhaust steam for feed-water heating. In this arrangement, additional flexibility and insurance has been obtained by having two circulating pumps for each condeners. The engine room in both cases takes up the full width of the ship.

The saving in space by the arrangement shown in Fig. 3 as compared to that in Fig. 5 is self-evident; the engine room would be 12 to 14-ft. less in length, which saving is of considerable value.

Fig. 4 shows the space required for the motor room aft. As previously stated this motor room should be placed as far aft as

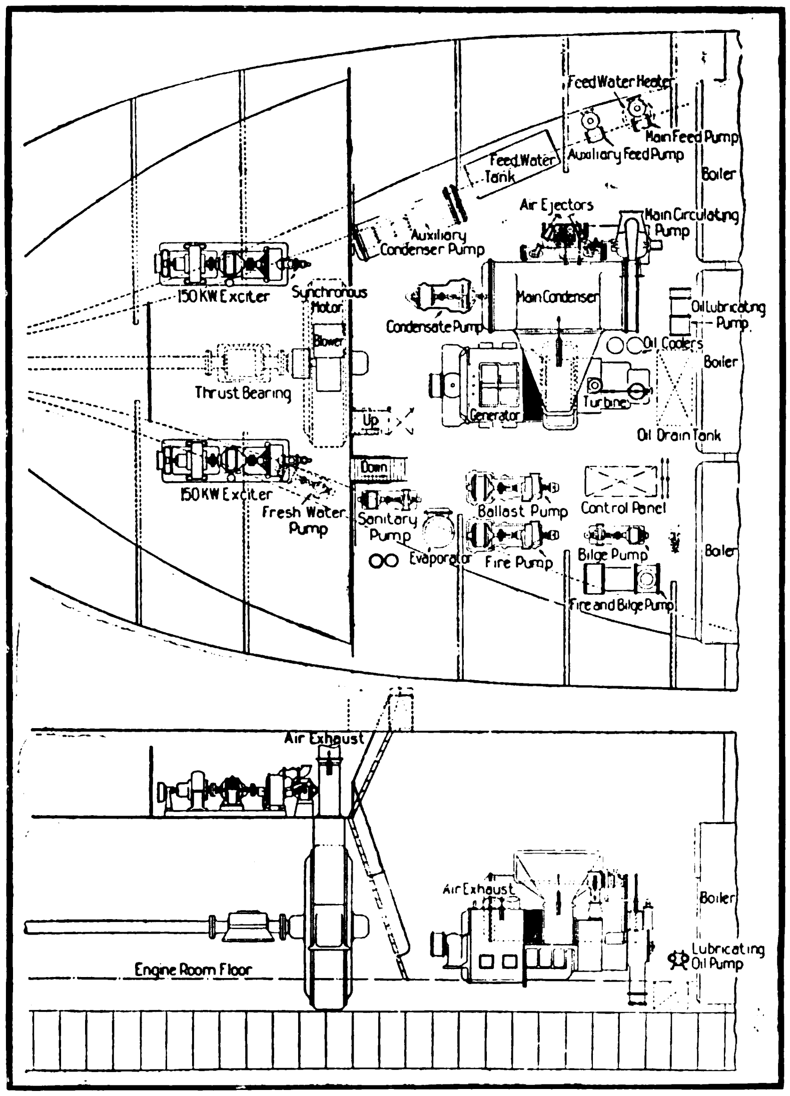


Fig. 6.— An Arrangement of Turbine-Electric Drive for Single Screw Vessel in which all Apparatus is Placed Aft

the lines of the ship will permit, thereby eliminating as much shafting and shaft-alley as possible.

Fig. 6 shows an arrangement for a turbine-electric driven single-screw tanker, or any other ship in which all machinery is placed aft. In this arrangement the main turbine generator is placed down on the engine-room floor with top exhaust, and the only apparatus carried on the upper flat are the two auxiliary direct-current turbine generators. The same scheme of electrically-driven auxiliaries has been carried out as in the other arrangements described.

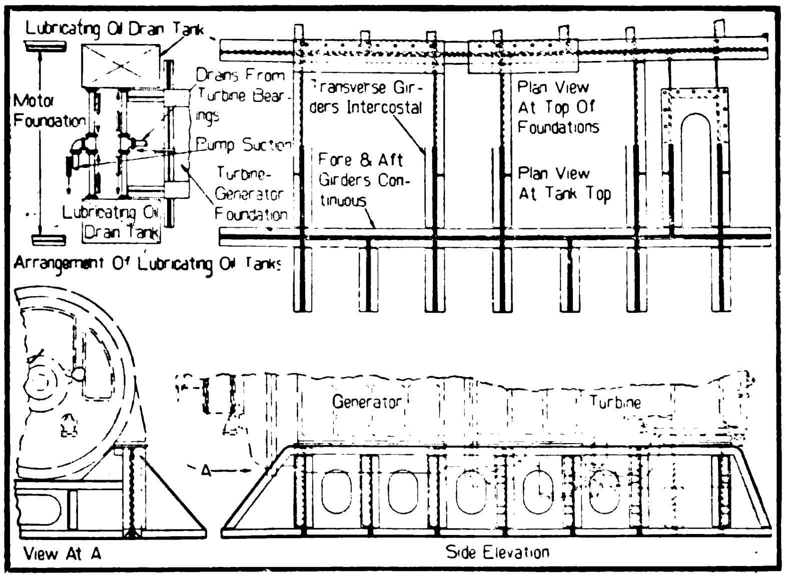


Fig. 7.—Typical Foundation for 3,000 Shaft H.P. Turbine Generator

In all arrangements of engine rooms, one should keep in mind the service and duty of each auxiliary because the proper type of drive, grouping, and arrangement will eliminate a great deal of duplication in piping, as the pumps that are to be interconnected to the same service should be arranged as closely together as possible Also, all pumps should be kept above the engine-room floor and be accessible, for the best safeguard for keeping a pump in satisfactory-operating condition is to have it where a man can see it and readily get at all its parts.

The matter of proper foundations for marine turbine generators, motors and gears is one that should be given very careful consideration, as the proper functioning and life of the equipment depends upon true alignment and keeping of this alignment under all conditions of serveice and operation.

Fig. 7 shows a typical foundation for a 3,000-s.h.p. turbine generator which would be placed on the upper platform as shown in Fig. 1 or on the tank top as shown in Fig. 6. This foundation consists of two fore-and-aft girders of sufficient depth to insure the after, middle, and forward bearing points being kept in line regardless of the working of the ship. The generator and turbine after foot is carried directly on the side girders, while the forward turbine foot is carried on athwartship plates framed into the longitudinal girders in such a manner as to carry the weight of the forward foot to the longitudinal girders and to also insure sufficient flexibility to take care of the expansion in the forward end of the turbine due to the changes in temperature of this portion of the unit.

When the turbine generator is carried on the tank top, this foundation should extend over as many frames as possible so as to distribute the loading and prevent concentration. When the unit is carried on the upper flat, a somewhat similar foundation should be placed under the turbine and also on the tank top, both of which should be properly framed to take care of the supporting columns. The girders are framed together at several points and are also provided with outside gusset plates to insure proper bracing against rolling.

The entire foundation is built up of plate and angles provided with rider plates in way of all bearing points, which plates should be ground off to facilitate the fitting of liners, which should be not less than 1½-in. thick. All bolts for bolting down apparatus to foundations should be fitted bolts.

A typical foundation for a 3,000-s.h.p. motor consists of two fore-and-aft deep girders, one under each foot of the motor. The girders are well gusseted to the tank top and are tied together on the forward and after sides by means of plate work, which should form a water tight pit in which the motor sits. These plates on the forward and after sides should be made with a removable section to permit the drawing of the motor rotor.

As in the case of the turbine-generator foundation, the motor foundation should be distributed over as many frames as possible.

The General Electric Company makes a two-plane type turbine reduction gear and several of these have been installed in place of the single-plane type. Fig. 8 shows how readily this can be done with a minimum amount of work to the existing foundation.

The work to be done in making this change is the adding to the width of the foundation for the low-speed gear feet which are wider in the case of the two-plane type, the providing for the supporting of the turbine which has been raised approximately four feet, and a new exhaust trunk. The supporting of the turbine in its raised position is taken care of by a superseating structure which supports the forward turbine foot and the high-speed gear foot and is built up in the shop and attached to the existing foundation.

By actual experience, it is proved that practically all of this steel work for the superseating and exhaust trunk can be gotten out in the shops and assembled before the ship arrives; and this change from single-plane type to two-plane type of gear can be made in a very few days with naturally a corresponding minimum of expense. The turbine in its raised position requires the fitting of extension rods to the throttle levers if these are still to be operated

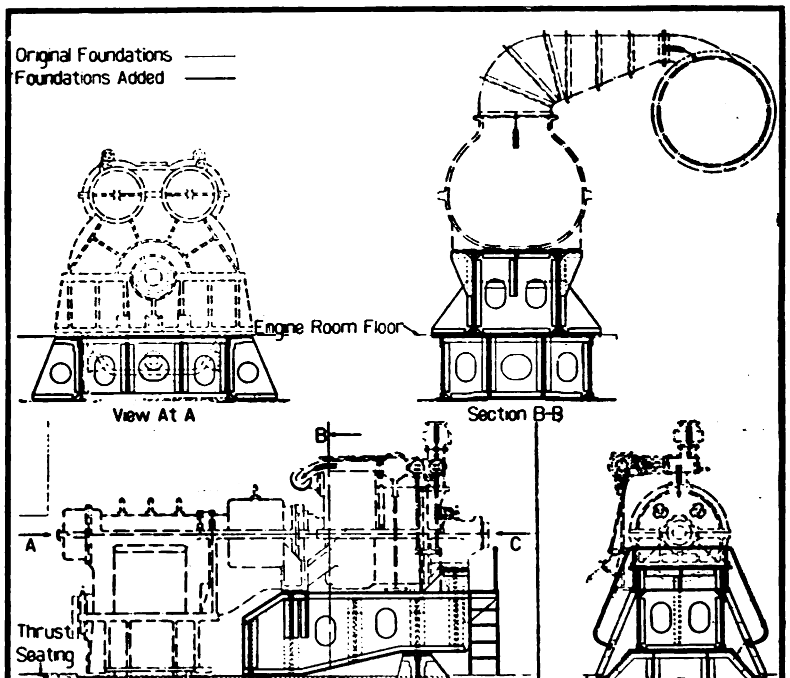


Fig. 8.—Diagram Showing Changes in Foundation Required when Substituting Two-plane Reduction Gear for Single-plane Gear

from the engine-room floor, but this is readily done as shown in Fig. 8.

In all cases where this change has been made it has required very little work, if any, to the remainder of the ship aside from the foundation.

The Hidachi Copper Smelter

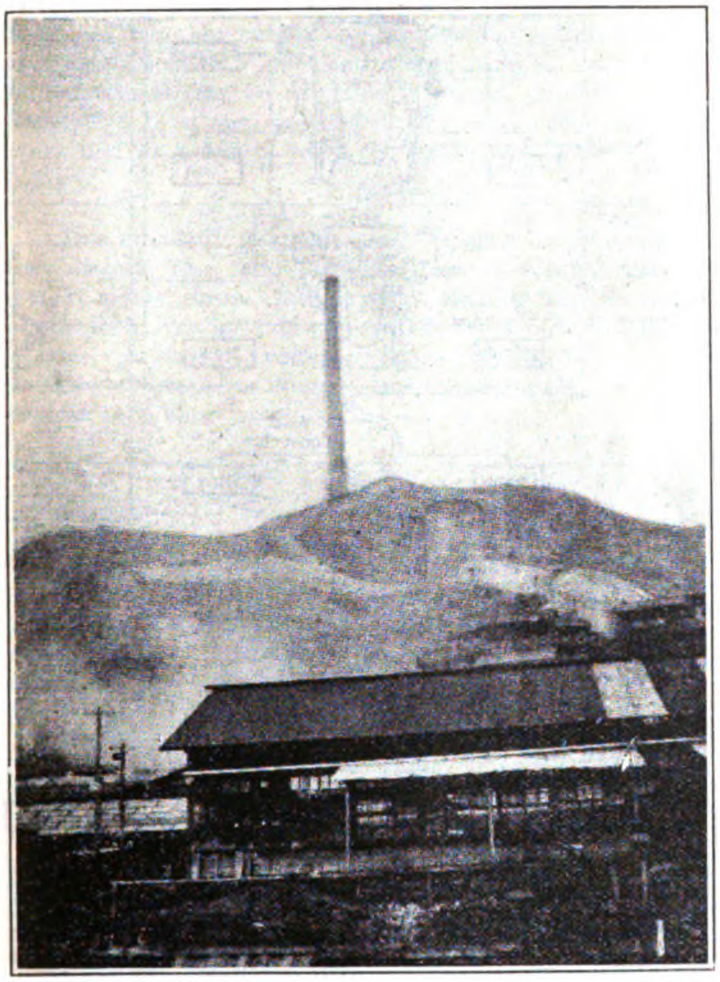
Chief Features of this Large Japanese Works

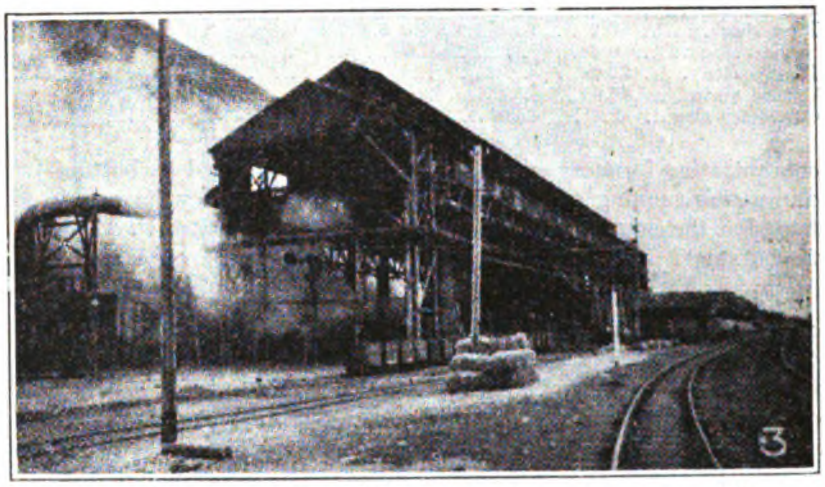
By Charles F. Mason

To many American smeltermen the Hidachi copper smelter, at Ibarakiken, Tagagori, Hidachi-mura, Japan, is known principally as "that Japanese copper smelter where they have the highest concrete stack in the world." It is interesting to learn that this stack was built several years ago, not with the idea of establishing a world's record in chimney construction, nor because its great capacity was really needed from a metallurgical standpoint, but to protect the tobacco which is grown in the vicinity from the effects of the sulphur fumes. The stack rises 550-ft. from its foundation on the top of a hill about 200-ft. above the smelter and 1,220-ft. above the level of the sea, three or four miles away. It stands several hundred yards away from the nearest point of the smelter proper, to which it is connected by a main flue and a number of branches, all of which are built of reinforced concrete. It is said to have a capacity of a million cubic feet of gases per minute. Even with its great height, it is necessary to curtail smelting operations at certain times during the tobacco- and rice-growing season, when the observation stations in the vicinity report the wind in a dangerous quarter.

The ores smelted at Hidachi consist of about 70 per cent. of cupriferous pyrite from the Hidachi mine (both smelter and mines are owned and operated by the Kuhara company), and about 30 per cent. of custom ore, of which one-third is siliceous ore carrying about 3 per cent. copper, and two-thirds gold and silver-bearing quartz, containing about 85 per cent. silica. The latter is used for converter flux. As received at the smelter, all of the ores contain about 40 per cent. fines, separated by a ¾-in. grizzly.

The green-ore fines and blast-furnace flue dust are sintered together in large cast-iron tapered "pots," with great bottoms, 12-ft. in diameter and about 4-ft. in depth, having a capacity of sixteen tons per charge. A stand for one of these sintering pots consists merely of a metal ring, set about 4-ft. below the floor level, which makes contact with the lower edge of the pot all around the circumference of the latter when placed upon it. Inside of this ring is an opening which is connected with the blast main, and outside of it is an annular space which is connected to the flue, and thence to the stack. A thirty-ton overhead traveling crane places an empty pot on a stand. Rough straw mats are spread over the grates in the bottom of the pot and set afire. A sheet-steel hood, shaped like a truncated cone, the diameter of its base being slightly larger than the outside diameter of the annular flue, with inspection doors in the sides and charging doors in the top, is lowered into place over the whole, and the blast turned on slightly. Then a charge of ore and flue-dust is dumped in by the crane from a five-ton bucket with a bell-hopper bottom,





(1) View of the Big Stack from the Offices. (2) The Blast Furnace Plant, showing Endless Ropeway from Sintering Plant. (3) Sintering Plant.

followed, when it is well lighted, by a second and then a third. The average time required for sintering a sixteen-ton charge is about five hours, and the maximum blast pressure is about fifteen ounces.

When the sintering process is complete, the hood is removed and the pot with its charge is carried by the crane to the breaking floor, where the charge is dumped and broken up by an electro-magnetic "skull cracker," the pot being ready for another charge as soon as replaced on a stand. The sintered material, after being broken up, is passed over a 1-in. grizzly, where about 20 per cent. is removed and reverted to the sintering process, the remainder going to the blast furnaces by means of electric locomotives and an endless ropeway.

There are ten blast furnaces, all 48-in. in width at the tuyères and of lengths as follows: three 15-ft.; three, 20-ft.; two, 24-ft. and two, 40-ft. Only seven of the smaller furnaces are in operation at this time, six for first matting and one for matte concentration. The tonnage smelted varies frxm 170 tons of ore, for the 15-ft. furnace, to 250 tons, for the larger furnace, per furnace per day. The ore-column in all cases is about 11-ft. high, and a maximum blast pressure of twenty ounces per square inch is used. A 20 per cent. copper matte is obtained from the first furnaces, and is concentrated to about 35 per cent. in the second. Water-cooled fore-hearths, of probably fifteen or twenty tons' capacity each, are used, one to each furnace, and the first matte is tapped into the pans of an endless conveyor, to facilitate cooling and breaking up. The first-matting furnaces are situated in parallel positions and charged through side doors in the tops by hand, whereas the matte-concentrating furnaces are end to end and are charged by bottom-dump cars running on a track over their tops. They have side flues, but the charging floor is remarkably free from fumes, thanks to the big stack. The flue dust is about 2.7 per cent. of the ore charged.

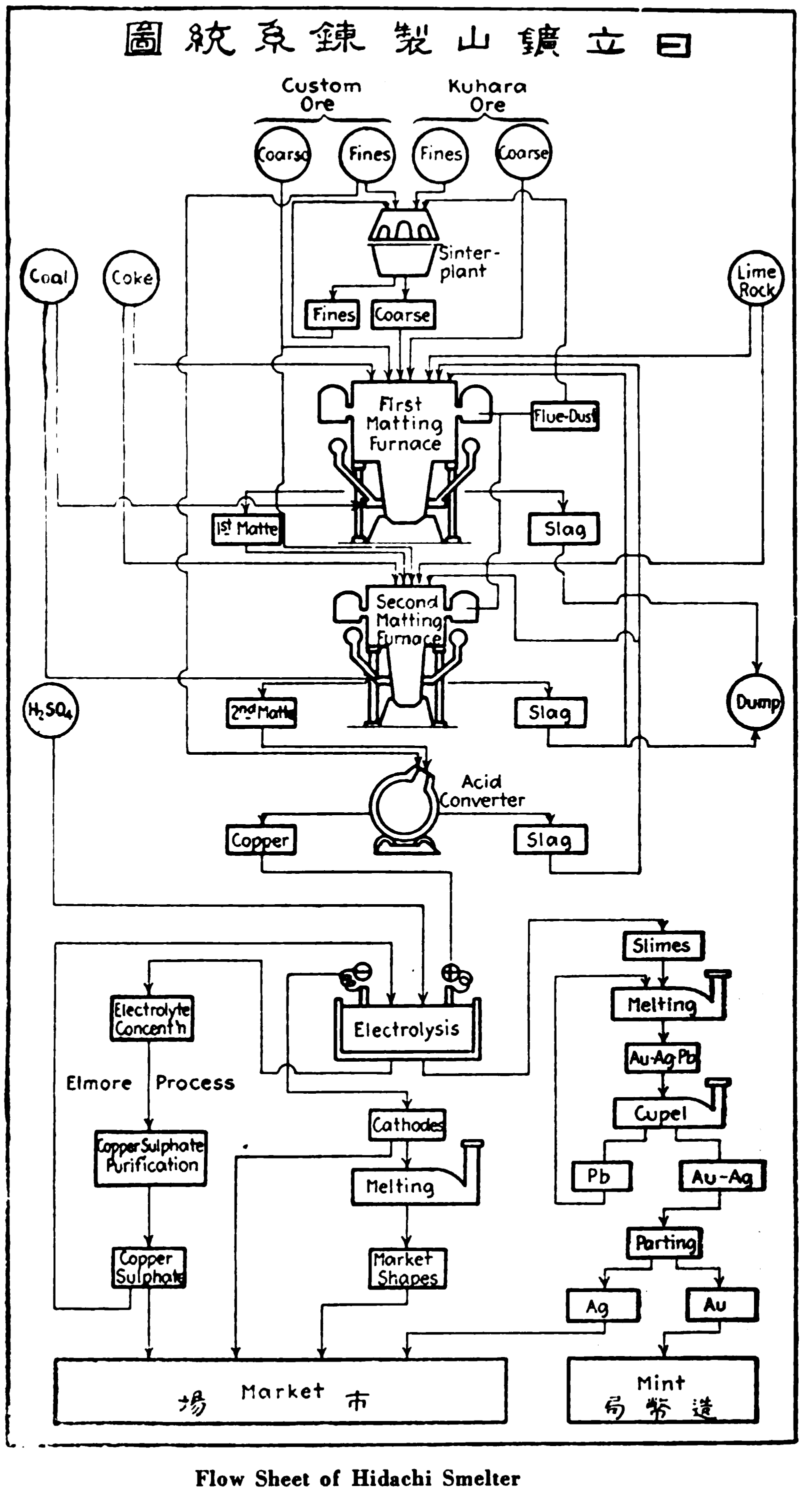
TYPICAL ANALYSES—HIDACHI SMELTER
KUHARA MINING CO.

Material	Cu	Pb	Fe	Zn	SiO_2	Al_2O_3	$BaSO_4$	S	CaO	MgO	MnO	CO_2	SO_3
Hidachi No. 1 ...	2.9	...	28.8	1.8	23.8	6.2	0.8	29.5	0.8	3.4	0.3	......	...
Hidachi No. 2 ...	3.0	...	30.0	1.9	18.5	6.2	1.2	32.5	0.9	3.9	0 4	......	...
Pyrite cinder......	2.9	...	46.6	3.6	11.1	4.0	1.1	7.0	0.9	1.4	0.1	......	4.6
Custom Cu ore ...	7.3	0.2	13.6	1.2	55.4	5.0	0.4	14.1	0.4	1.4	0.1	0.02	...
Au-Ag flux	0.1	...	1 9	0.4	83.8	4.7	...	0.3	0.4	0.4	4.7	0.13	...
Sinter-cake	3 2	0.2	35.1	1.8	30.7	5.8	1.1	5.5	0.9	2.9	1.0	......	...
First slag	0.2	...	25.8	1.1	38.0	8.8	0.9	0.8	2.3	3.6	0.6	......	...
Second slag	0.4	...	...	...	41.0	...	...	...	...	...	...	......	...
First matte	20 0	...	...	...	...	...	...	...	...	...	...	......	...
Second matte ...	35.0	...	...	...	...	...	...	...	...	...	...	......	...
Converter slag ...	2.4	...	45.0	...	26.0	...	...	...	...	...	...	......	...

The fuel used in the blast furnaces is 7.5 per cent. of the ore charged, and consists of one-third coke and two-thirds bituminous coal. The former is charged in the usual way, with the ore and flux, whereas the latter is charged through the tuyères by means of hand-operated plungers working in small cylinders which are introduced through the tuyère caps. The coal is crushed previously to about 1-in. size, and a charge consists of about 7-lb. Needless to say, this method, although showing fuel economy from a metallurgical standpoint, is wasteful of labor, and plans are being made to use pulverized coal instead.

The copper recovery in all of the blast furnaces is apparently good, being reported as 90 per cent. or better for the entire plant. It will be noticed that the copper content of the first slag, as shown in the table of analyses above, is 0.2 per cent. and that of the second slag approximately 0.4 per cent. It is only recently that the second slag loss has been brought down to this figure, thereby cutting out a large amount of revert. All blast-furnace slag is granulated in water, drained, and hauled to the dump in electric cars.

Acid-line converters of the barrel type, 68-in. in diameter and 8-ft. long, receive the 35 per cent. matte direct from the small ladle-cars into which the matte-concentrating furnace settlers are tapped. There are six converter stands. The tilting device consists of a vertical hydraulic plunger, operating a rack which engages a gear on the converter trunnion. The converter blast is supplied by a motor-driven turbo-blower at a pressure of 8-lb. per square inch, and each converter has eleven 1¼-in. tuyères, only nine of which are open in a new lining. The slag carries an average of 2.5 per cent. copper, and is reverted, cold, to the first-matting furnace. The blister copper is cast into 24 by 30-in. anodes, weighing



Flow Sheet of Hidachi Smelter

about 400-lb. each, through a swinging launder, in stationary copper molds arranged in a semicircle and cooled with water jets underneath in the usual manner.

I am indebted to Mr. Tokuzumi, metallurgical engineer, and Mr. H. Kajikawa, mechanical engineer, of the Hidachi smelter, for their courteous assistance in securing the information and data presented in this article.– *Engineering and Mining Journal.*

The New Serum Laboratory at Alabang

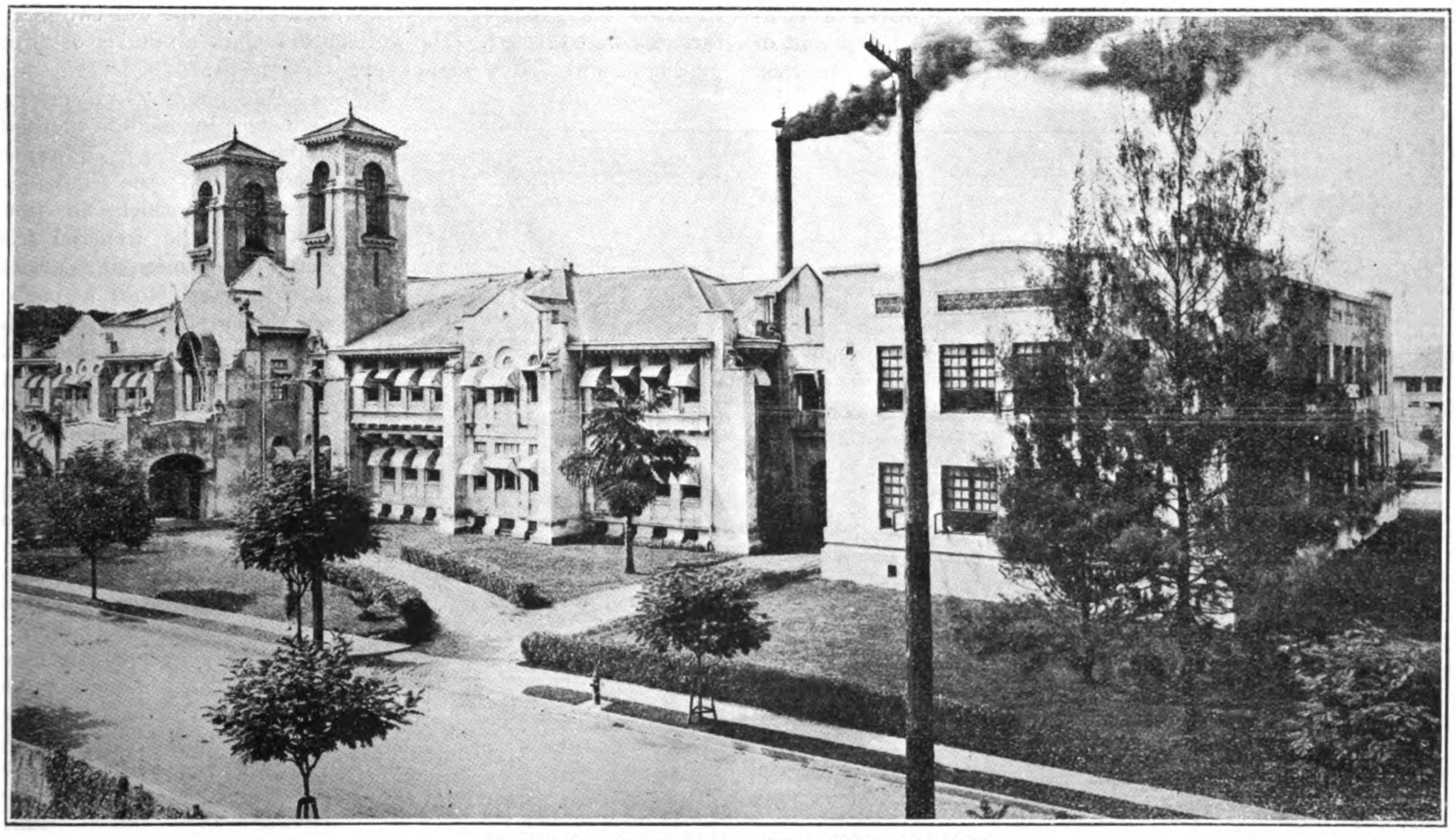
By the Bureau of Science

THE serum laboratory of the Philippine bureau of science was moved to Alabang the latter part of March and actual operations in the manufacture of serums and vaccines were commenced early in April. It is conveniently located on the Manila-south road, 25 kilometers from the city, on the rising ground overlooking Lake Bay. While the plant is not yet perfect owing to certain small details of construction not having been finished, it compares very favorably with similar institutions abroad so far as its general equipment is concerned. For its specific purposes, which are really the function of a pasteur institute, the serum laboratory is admirably located and in the immediate future we should be able very radically to increase our output of serums and other biological products. For the establishment and equipment of the serum laboratory at Alabang great credit must be given to Dr. G. Apacible, secretary of agriculture and natural resources, who has consistently supported our plans for establishing this institution on a sufficiently large scale so that the products manufactured may be available in ample quantities to meet all demands. It is the only institution of its type in the Philippines and its products serve the entire population of the archipelago.

The standard products manufactured in the serum laboratory include the following:—antitetanic serum, antidysenteric serum, normal serum, vaccine virus, cholera vaccine, typhoid and paratyphoid vaccine, dysentery polyvalent vaccine, bacillus coli vaccine, gonococcus vaccine, staphylococcus albus and aureus vaccine, streptococcus vaccine, and the materials necessary for the pasteur anti-rabies treatment.

From the time the serum laboratory was transferred to the bureau of science in 1903 up to the year 1918 the quarters assigned to it were wholly insufficient to warrant any great development of the work. It was originally located on the grounds of the San Lazaro Hospital, but in 1906 was transferred to the grounds of the bureau of science. The laboratory space available in Manila was indequate and, being in close proximity to the power plant of the bureau of science, was very poorly located for the purpose intended. Little space was available for animals, and up to 1916 but a single stable was available for housing all of the animals carried by the serum laboratory. Until proper space was provided in 1916 but six horses were maintained for the purpose of producing serums, and a small number of calves, for the purpose of manufacturing vaccine virus. With these strictly limited facilities, it was, of course, absolutely impossible for the serum laboratory to supply serums, vaccines and other biological products on a scale sufficiently large to meet all demands.

Up to the present time, owing to the limited facilities available in Manila, the bureau of science has never been able to produce certain essential serums in sufficient quantity to meet all demands. A notable example of this is antidysenteric serum, the demand for which invariably increases at the beginning of each rainy season. We have at times been obliged radically to restrict the sale of this product on account of the lack of reserve supplies, and at times have even been unable to supply all that the Philippine general hospital needed. With the ample space now available at Alabang, not only for laboratory and manufacturing purposes but also for the maintenance of the necessary live stock, the bureau of science should be able to produce all standard types of vaccines and serums in sufficient quantities to meet local demands.

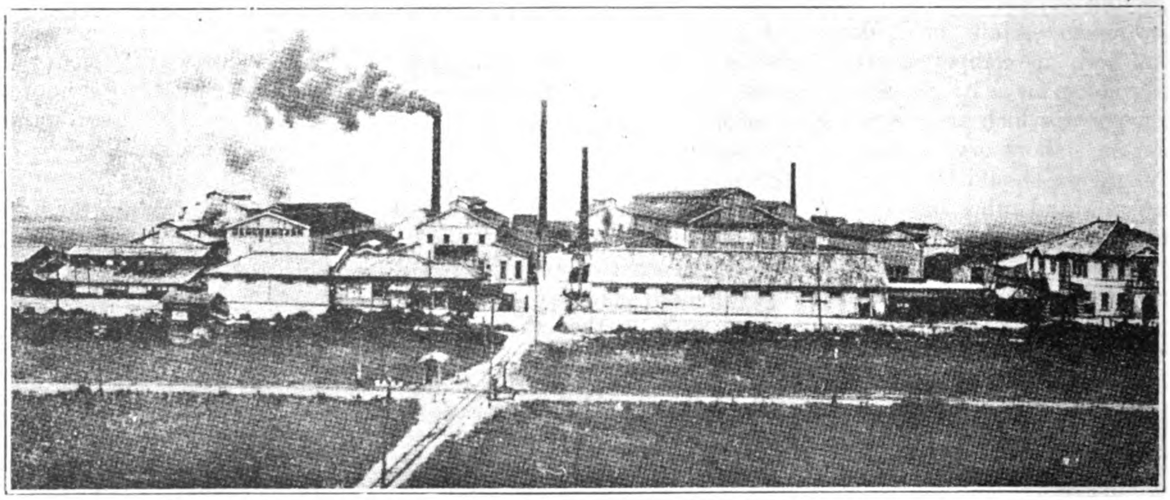


BUREAU OF SCIENCE BUILDING, MANILA

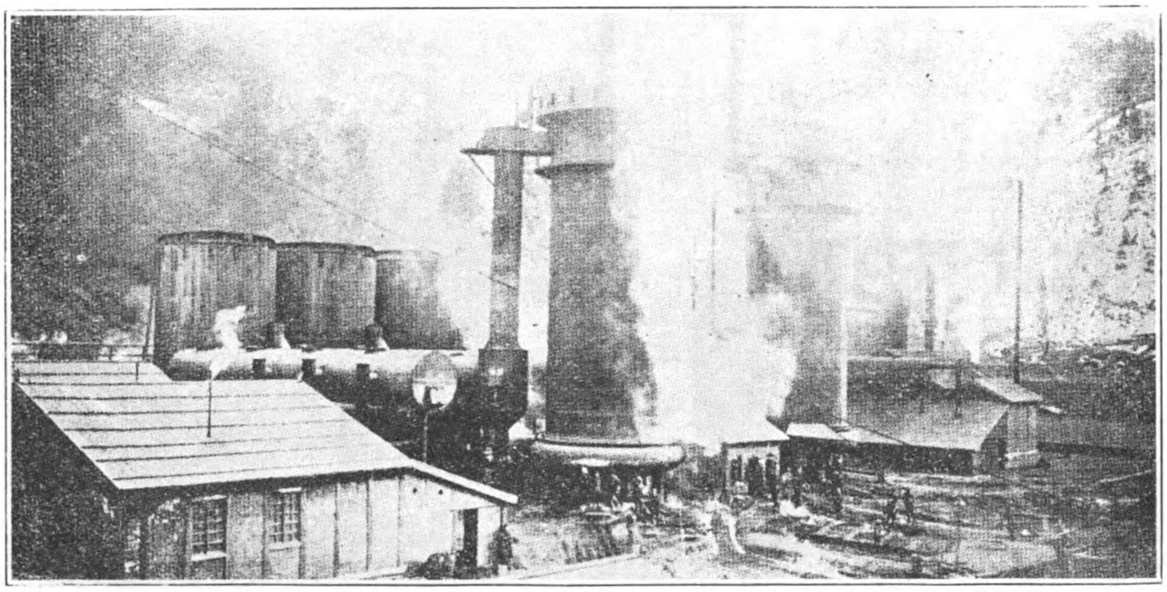
The Bureau was recently erected and is now operating a New Serum Laboratory and Pasteur Institute producing commercial serums for other parts of the Far East

Japan's Iron and Steel Industry

A VALUABLE contribution to Japan's iron and steel industry appeared in the *Times Special Japan Supplement*, of April 16. The following abstract of the article, which was written by Mr. L. P. Sidney, will be of interest to those who have not read the original in *The Times*. Mr. Sidney says that the contrast between the old methods of manufacture and those in vogue at the present day show the high degree of progress which is characteristic not only of this industry but of other industries of the island empire. At the same time it must be admitted that the progress has been less satisfactory from an economic point of view than from a technical standpoint. Indeed no less than ten years ago it was authoritatively stated that there was but one Japanese works which was on a paying basis. This was the Kamaishi iron and steel works, belonging to Chobei Tanaka, who made the first really successful attempts to manufacture iron and steel by modern methods, and may be said to be the real founder of the iron and steel industry of Japan. Magnetite ore of good quality, and limestone, had been discovered at Kamaisha as far back as 1823, and in 1864 there were ten small furnaces, each of a capacity of four tons of pig iron per day. The enterprise was acquired by the imperial government, but proved a commercial failure from first to last, although an enormous amount of money was spent in improving and enlarging the plant. In 1882 operations were suspended, as neither the quality of the material nor the economic conditions under which it was produced were satisfactory. Mr. Tanaka acquired both the mine and the works from the government in 1885, and the subsequent history of this works affords a striking example of the advantages of private enterprise.



View of the Sumitomo Steel Works



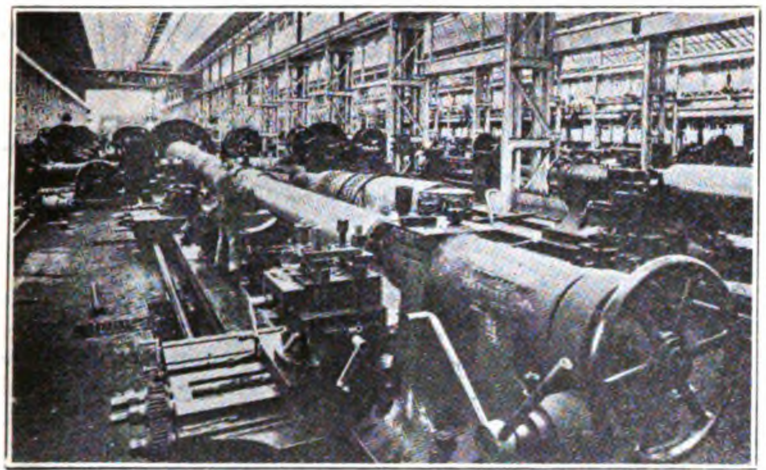
Blast Furnaces of the Kamaishi Iron Works

It was not long before the works became a success, and were the only iron and steel works in Japan which were being run at a profit. The plant now consists of eight blast furnaces, of which one is working on a charcoal burden, and the annual output of pig iron is about 70,000 tons. There are beehive retorts, ovens, and recovery ovens, and the coke consumption is about 32 cwt. of coke per ton of pig. Ferro-manganese is also made, as well as spiegel, the coke consumption being 3½ tons and 2 tons, respectively, per manganese and 12 per cent. spiegel. The company manufactures its own silica bricks for lining the blast furnace, excellent ganister being mined in the vicinity. There are four basic open-hearth furnaces of ten tons capacity each, and during the war two larger furnaces were erected. The works also include a number of three-high mills and a large pipe-casting department.

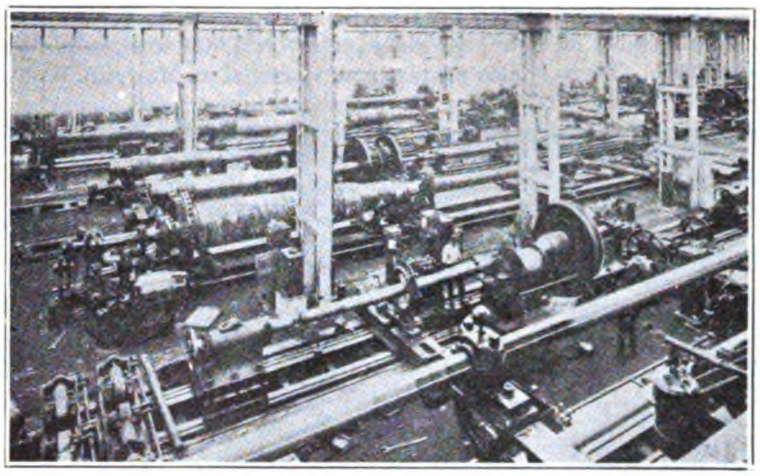
The manufacture of iron and steel by modern methods in Japan has been constantly fostered by the Japanese government, which, in 1899, established the Imperial Iron and Steel Works at Yawata-machi, near Moji, a harbor on the western coast of the Inland Sea, the aim being to make steel from European pig iron, the supply of which was fairly economical owing to the low freights then existing.

Some twenty years ago the blast furnace plant at Yawata was put to work on Chinese iron ores, the Japanese iron ore resources having proved inadequate. The capital expenditure on this plant alone has been something like £10,000,000, but it has been handicapped by lack of experience and want of skill on the part of the workmen. The plant is, notwithstanding, the largest and most improved steel-works in the country, and has proved a valuable training school for metallurgists. It has a capacity of about 350,000 tons per annum. The coke plant consists of six batteries of six-ton

VIEWS OF THE JAPAN STEEL WORKS AT MURORAN



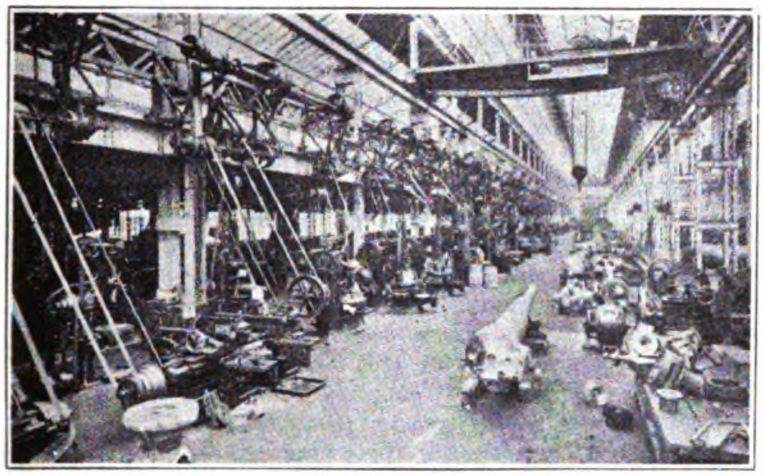
Rough Turning Gun Tubes



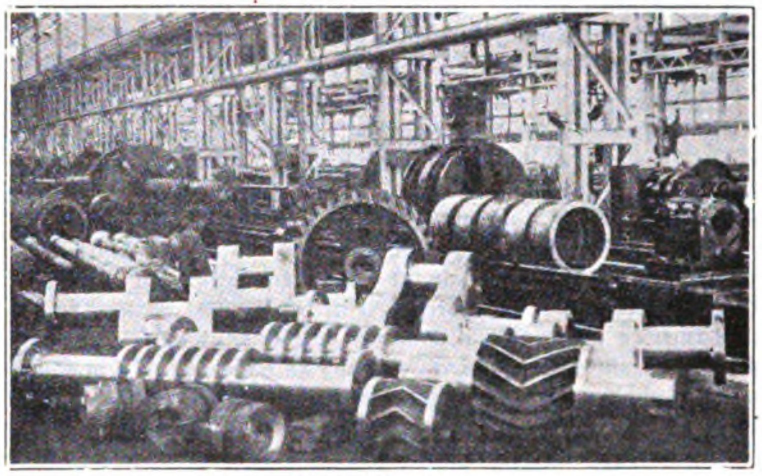
Gun Lathes, Machine Shop

Semet-Solvay ovens, comprising 150 ovens, and a battery of 120 Koppers ovens. There is a large and well-equipped by-product recovery plant. To the five fairly large modern blast furnaces already in use a sixth, in course of construction, is being added.

The five furnaces already erected have a capacity of 250 tons of pig iron each. The capacity of the new blast furnace will be

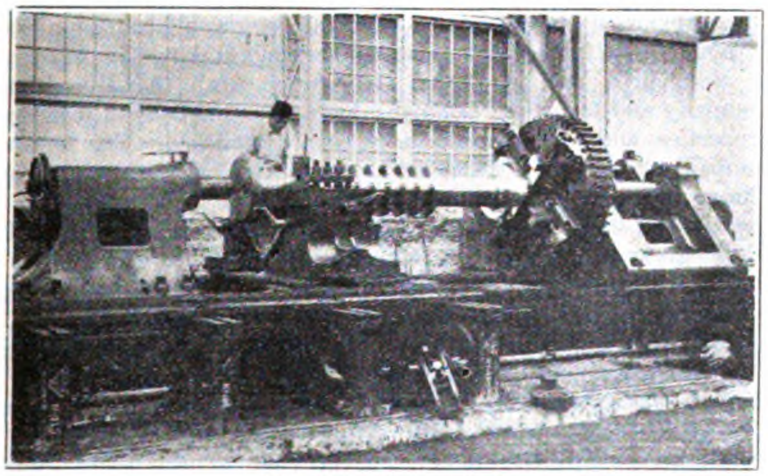


Machine Shop

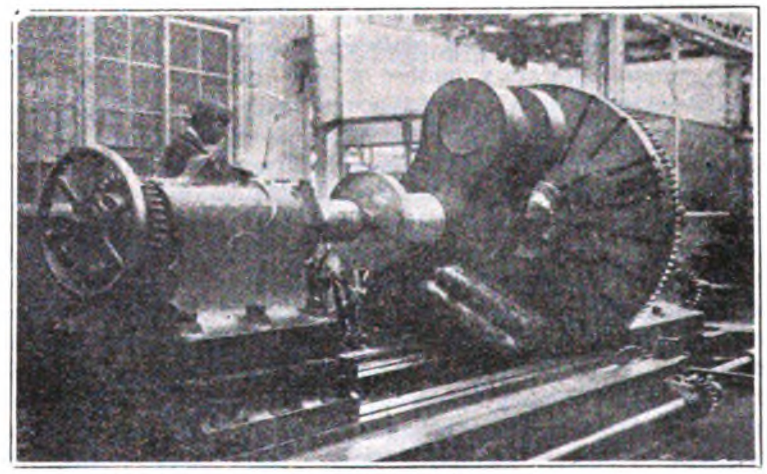


Various Products

about 300 tons. Each of the furnaces is provided with four Cowper stoves. The charges are taken by an inclined hoist to the furnace top and dumped on to a double bell contrivance of modern type. The steel plant is on a large scale. There are twelve 25-ton open-hearth furnaces, six 50-ton furnaces, two 60-ton furnaces, and two smaller furnaces of 15-ton and 10-ton capacities respectively. The mill department includes rail, bar, medium and small mills, besides plate and sheet mills, and the aggregate horse-power capacity of the plant is 30,000. The number of workpeople employed is 10,000. Orders have been placed in the United States for electrical equipment intended to supersede the existing steam-driven 40-in. reversing mill. The new mill will be operated by a 3,500 single-unit motor, and will be capable of rolling 50 tons of steel per hour from ingots measuring 20-in. square. A new slabbing mill is also to be installed, to roll steel ingots up to 25 tons in weight. Much of this machinery has been delivered, but the conditions in the trade are such that the plant has not yet been got to work.



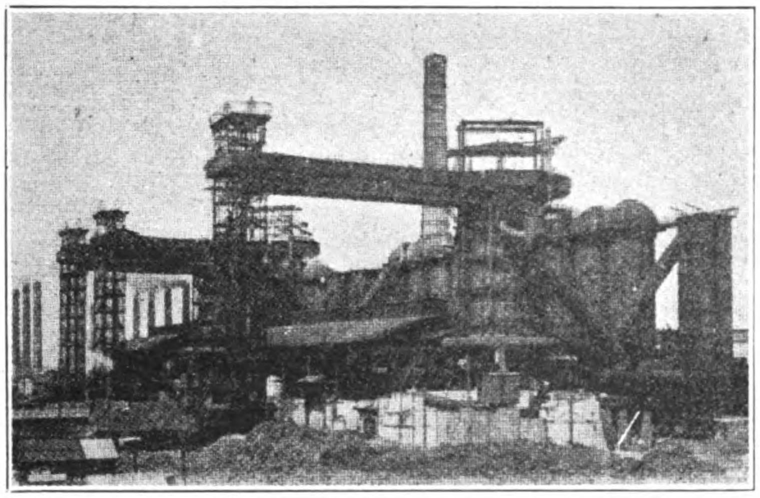
Turning a Thrust Shaft



Crank Shaft Lathe

Government Arsenals

Besides the imperial steelworks, the government also have a naval arsenal at Kure, at which close on 5,000 workpeople are employed. There is also an important arsenal at Muroran, equipped with the most modern plant and machinery, and comprising blast-furnaces, steel furnaces, and rolling mills, besides ordnance



Blast Furnaces at the Imperial Steel Works, Wakamatsu

and small arms works. In addition to ordnance requirements it is intended to manufacture railway wheels, axles, rails, girders, and structural steelwork.

Amongst other private enterprises should be mentioned the newly-projected Kiushiu steelworks. This plant will have three 50-ton basic open-hearth furnaces, and should circumstances justify the future development five additional furnaces are contemplated. The rolling mills will be electrically driven, and will comprise a 32-in. blooming mill, an 84-in. plate mill, and a 24-in. structural mill. The whole of the machinery and equipment for this works has been purchased in the United States. A new blast-furnace plant with a capacity of 150,000 tons per annum, is also being built by the Toyo Company at Kiushu, and a new plate mill is being put down for the Imperial Steelworks Kobe plant. This mill will be the second largest plate mill in the world, being a standard two-high mill for the rolling of plates up to 180-in. in width and 2-in. thick. An interesting feature of this plant is that some of the auxiliary motors will be of Japanese manufacture, the "Shibauka" type, 84 h.p., having been selected. The main drive will be by means of a twin tandem compound reversing rolling mill engine, 44-in. by 70-in. by 60-in.

The "Black Country"

Kiushiu may be described as the "black country" of Japan, but there is a rival iron trade centre in the northern island of Hokkaido, where there are a number of blast furnaces, as well as the Muroran Arsenal, to which reference has been made. The Nippon Steel Foundry in Hokkaido was the result of the co-operation of the Mitsui Company with Messrs. Armstrong & Co. and Messrs. Vickers, Sons, and Maxim, Limited. It was originally designed to treat local iron sand concentrates, but has more recently been converted so as to deal with imported ores from China. Several other ironworks exist in Hokkaido, amongst which may be instanced the Wanishi ironworks, with two blast furnaces. At Osaka there are both iron and steelworks, the most modern being the Sumitomo steelworks, consisting of one 15-ton acid and one 15-ton basic open-hearth furnace. Near Osaka a rich ferruginous earth occurs, containing from 65 to 95 per cent. of iron oxides. A project has been put forward for an electrolytic process of manufacturing iron from this material, the estimated cost being £5 per ton. An experimental plant was to have been established near Kensaki, but, according to the latest reports, the scheme has been abandoned.

New works have also been established recently at Karatsu, and amongst the older works may be mentioned the Fuji Oshima Iron and Steel Company and the Nitto Ironworks, also works at Kobo and Tokai. The Nitto works are laying down a tinplate plant, but there has been considerable delay in securing the machinery from the United States. Tinplates will also be made at Yawata.

Small Works

Before the war there were approximately 250 small works and 12 to 16 blast furnaces in Japan. During the war many of the small works were either amalgamated or ceased operations, while the larger works were greatly extended and enjoyed a brief period of unparalleled prosperity. Dividends of 50 and 60 per cent. were quite common. The Japan Steel Tube Company made a net profit of 120 per cent. in 1917. The production of iron and steel during the first and last years of the war affords an interesting indication of the degree to which the iron trades expanded. They are shown in the table below :—

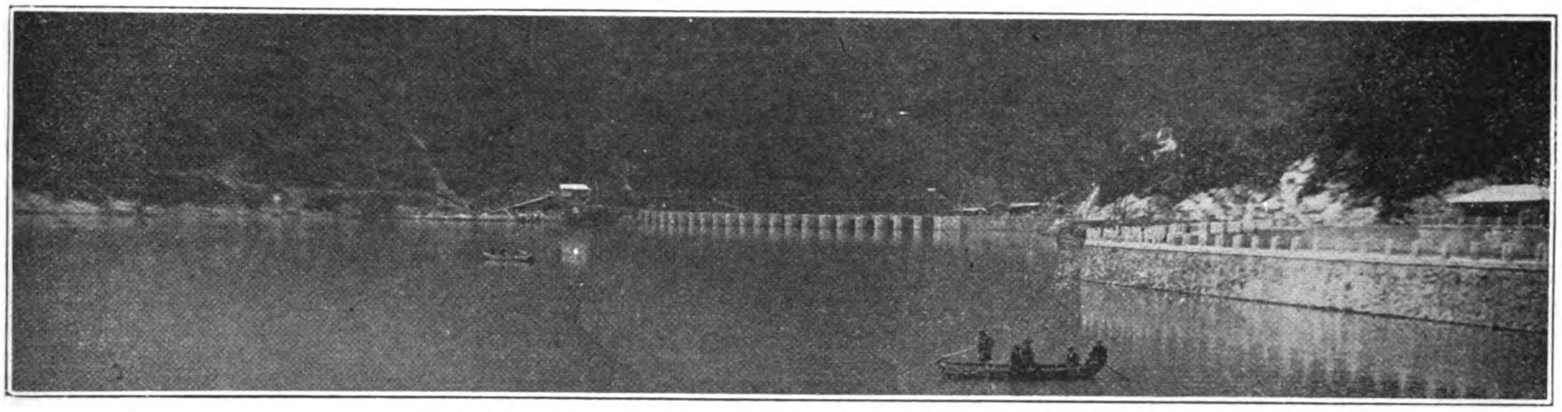
	1914. Tons.	1918. Tons.
Pig iron	300,221	671,168
Alloy pig iron ...	1,505	23,670
Total	301,726	694,838

At the time of the armistice it is estimated that there were 250 ironworks in Japan in full operation, comprising 54 blast-furnaces, 95 open-hearth furnaces, 17 converters, and 47 crucible furnaces. It is interesting to note how greatly the electric furnace has grown in favor in Japan, as there were in 1918 over 200 of these furnaces at work. The estimated capacity of the iron and steelworks of Japan during this period was 1,200,000 tons of steel per annum. The boom which prevailed during the war and encouraged the expenditure of vast sums of money for the extension of the home industry has been succeeded by a severe slump. The needs of Japan in iron and steel are so considerable that her rulers are disinclined to establish a protective tariff in favor of home production. At the same time it is difficult to see how the native industry can compete with supplies from other countries. At present the United States has enormously increased her exports to Japan. In 1913, for instance, Japan imported about 7,200 tons of steel plates from the United States. In 1919 the imports amounted to 244,000 tons, and while other iron and steel products did not perhaps increase in the same proportion, they were in many instances ten times greater in 1919 than they were in 1913. Japan's imports of metal-working machinery from the United States in 1919 were valued at over £1,250,000.

In Adjacent Territories

A review of Japan's iron and steel industry would be incomplete without some further reference to her undertakings in Chosen, in Manchuria, and in China. In Chosen both the Mitsubishi Company and the Mitsu Company have large interests in iron ore properties, and several works have been established. The former company has built a blast furnace at Kenjiho in North-West Chosen. The most ambitious project controlled by Japan, outside Japan itself, is the Pen-hsi-hul Coal and Iron Company, Limited, whose works are situated 45 miles south-east of Mukden in Manchuria. The plant consists of two blast-furnaces of 150 tons capacity, the coal and ore both being obtained in the locality. The completed project, however, comprises eight blast-furnaces and a steel plant. The first furnace of this plant was blown in in January, 1915, and considerable success has attended the project. Reference has already been made in the body of this article to the Japanese interests involved in the ore mines of the Yangtze province of China and in the Hanyang Works.

Hydro-Electric Plants in Japan



Big Reservoir of the Kinugawa Hydro-Electric Company at Kurobe

WRITING in the *Times Special Japan Supplement*, Professor R. Torikai Professor of Electrical Engineering, Imperial University of Kyoto, says of the present development of hydro-electricity in Japan that 'in size and equipment, and indeed in every way, hydro-electrical works in Japan are not to be compared with those in various countries of Europe and America. Yet the natural features of Japan and the progress which the country has already made in this direction indicate that hydro-electricity has a great future in Japan. Already electricity generated both by water power and from coal is used for lighting purposes and transport and in chemical and other industries. Electric light is in almost universal use in Japan to-day, and even in small villages and in remote places in the heart of the mountains the inhabitants enjoy the benefit of this method of illumination and are no longer compelled to rely on the inconvenient oil lamp. This ubiquitous use of electric power is entirely due to the introduction of hydro-electricity.

The remarkable advance which Japan has made in the use of hydro-electricity is demonstrated by an examination of the generating equipments at present in use, a brief description of which I will now proceed to give.

As I have already pointed out, Japan is essentially a mountainous country. The traveler has not to go far before he can hear the whirring sound of water turbines. The loftiest mountains are situated in the centre of the country, and this district is known as the Japanese Alps. Here and at some of the lakes is to be found the greatest head of water. Fortunately the two great industrial centres—viz., Tokyo and Osaka— are situated not far from adequate water power supplies, and can thus be supplied with electricity economically and with little difficulty. Accordingly the large and typical hydro-electric concerns have naturally utilized these centres of water power and concentrated on the supply of power to these two cities.

In the case of the Ujikawa Electric Company, Lake Biwa is the source of water power, and supplies at the rate of 2,000 cu. ft. per second. The capacity of the power house is about 35,000 kw. at three-phase 11,000 volts and 60 cycles. This is stepped up to 55,000 volts and transmitted to Osaka, which is 20 miles distant, from the power house. At a sub-station near Osaka it is again stepped down to 11,000 volts, and distributed at that voltage over the city by underground cables. This is the usual system of distribution in the large cities, such as Tokyo and Osaka. This company, in conjunction with the Osaka Electric Light Company, which has an output capacity, generated from coal, nearly equal to the former, has been supplying most of the electrical current for Osaka. At the present time the rapid growth in the needs of this city has outrun the supply capacity of these systems.

Old Methods Discarded

The Ujikawa Electric Company is now building a second power station, and an interesting point about this work is the elimination of long tunnels and canals in the carrying of the water, and the introduction of river dams for raising the water level. The source of the River Uji is Lake Biwa, and its course is nearly parallel to the waterway of the first power station. By building a high dam across the river, and thus raising the level of the water to a height sufficient to generate the necessary power, the company is able to erect the new power house quite close to the old one, and canal excavation is therefore unnecessary. This is the first system on which the new method of damming has been employed. The erection of this new generating station will double the output capacity of the company.

The Ujikawa Electric Company and the Inawashiro Electric Company are the largest concerns in Japan. The latter is a large enterprise, and its rated total output capacity is larger than any other individual concern. The Inawashiro is a volcanic lake in the north of Japan, and is the source of a river which flows down towards the Wakamatsu Plains. Although the distance between the lake and the plain is very short, yet the difference in level between these two points exceeds 1,000-ft. To utilize the potentialities of this site the company plans to build a series of four large power houses, two of which have already been erected and supply electricity to Tokyo.

Capacity of Conductor Line

Two other power stations will be constructed in the near future. The second station has recently been erected, but I have not yet had an opportunity of seeing it. I understand that there is very little difference between it and the first station, which I shall briefly describe, as it indicates the extent of the company's capacities. Its generating capacity is about 40,000 kw. at 11,000 volts and 50 cycles. The voltage is stepped up by transformers and transmitted to Tokyo at 110,000 volts for a distance of 150 miles. The electrostatic capacity of the conductor line is so great that the charging current exceeds the capacity of each generator. The line consists of copper conductors and steel towers, nine suspension insulators being used. The voltage used in transmission is the highest in Japan, and the transmission line is also the longest so far constructed there.

These two companies, which I have described, can be taken as representing hydro-electric establishments in the western and eastern districts of Japan respectively. Hydro-electricity is also supplied by many other firms, and below are given the names of those possessing power capacities of over 10,000 k.w.

Komahashi Generating Station (Tokyo Electric Light Company).
Katsuragawa Electric Power Company.
Kinugawa Hydraulic Power Company.
Kiso Seitetsu Company.
Kiushiu Hydro Electric Company.

The transmission lines of most of these companies are over 50 miles long at a voltage of 55,000 or 66,000. All the companies already referred to, indeed all the power stations throughout the group of islands comprising Japan, are now working at full load, and have no surplus power to meet the increasing and unlimited demand for electricity. To supply this need many very large hydro-electric generating systems, dependent upon the water power resources of the "Alps," have been planned, and in some cases construction work has already begun. Among these new schemes are the following :—

FOR THE SUPPLY OF ELECTRICITY TO TOKYO

Hakusan Hydraulic Power Company.
Shinetsu Hydro Electric Company.
Tenryugawa Electric Company.
Gumma Electric Company.

FOR THE SUPPLY OF ELECTRICITY TO OSAKA

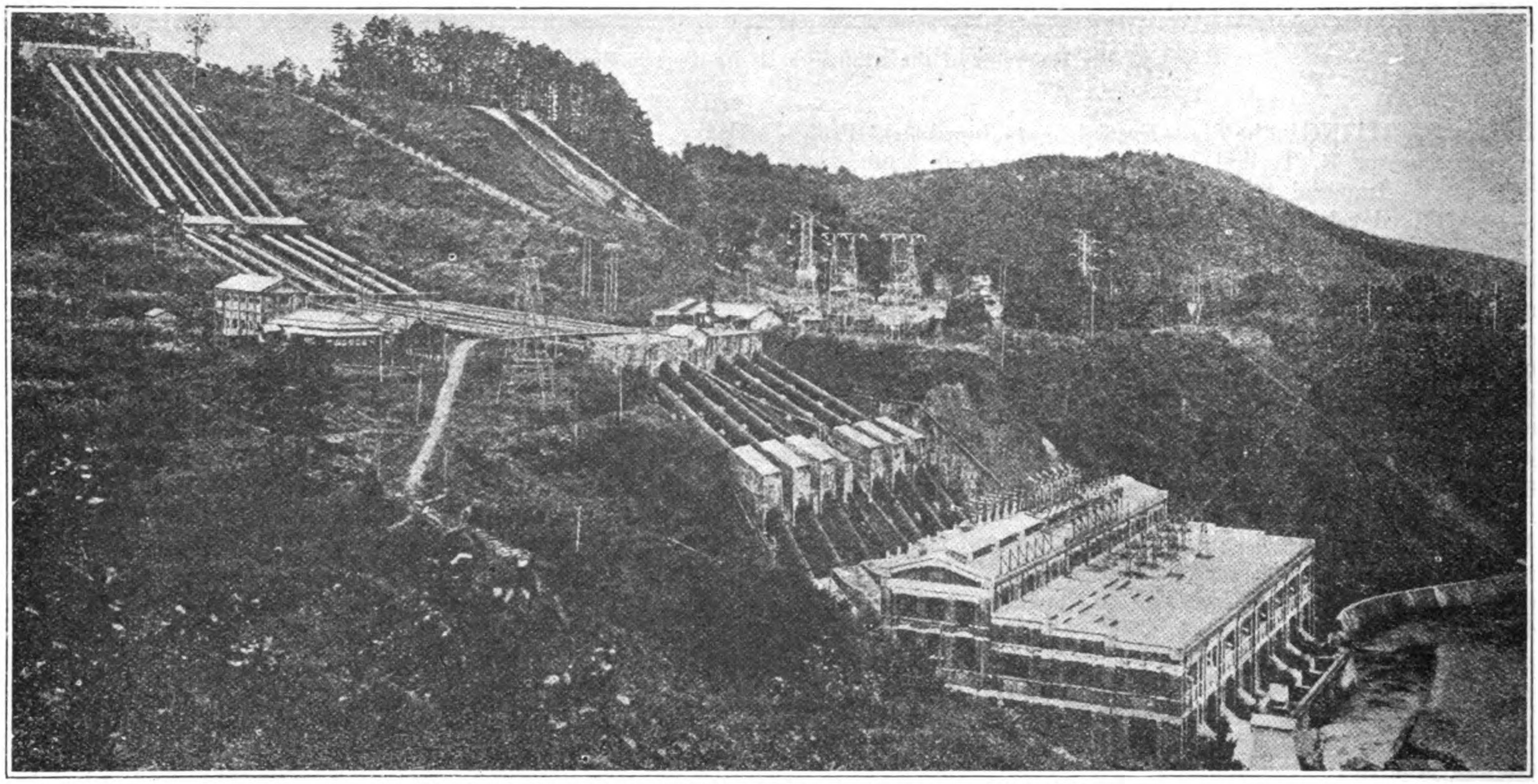
Nippon Electric Power Company.
Nippon Hydraulic Power Company.

All these projects provide for a very large output. The Gumma Electric Company will have a capacity of 60,000 k.w., the Shinetsu Company 170,000 k.w., the Nippon Electric Company 300,000 k.w., and the Nippon Hydraulic Company 300,000 k.w. Anyone who is unacquainted with the present demand for electricity in Japan might conclude that the construction of these systems will lead to an over-supply of electricity, but the present shortage and the anticipated increase in demand resulting from industrial developments and the substitution of electric for steam drive due to the high price of coal definitely point to the country's ability to consume all the electricity which will be generated.

It is unfortunate that one technical error has been committed in the development of hydro-electricity in Japan. In the eastern district centring around Tokyo the frequency of the alternating current is 50 cycles, while in the western districts centring around Osaka, the selected standard is 60 cycles. As the result of this discrepancy it is impossible to connect these two industrial cities by the one transmission line, and the two sets of generating stations cannot supplement each other, as, for example, in case of accidents. The truth is that 30 years ago no one foresaw the possibility of connecting Tokyo and Osaka, separated as they are by some 400 miles of country, and again it must be remembered that the development of electrical engineering has been on revolutionary lines. In order to eradicate this defect it is necessary that some kind of frequency-changing apparatus should be installed.

Extent of New Schemes

Some of the new schemes to which I have referred provide for transmission lines extending over 200 miles, and voltages of 165,000 have been decided upon. The construction of the electrical equipment necessary to supply 300,000 k.w. and transmit it over 200 miles at a voltage of 165,000 will naturally be beset with difficulties, but the results and experience obtained will prove both interesting and valuable, and if Japanese electrical engineers as a result are able in any way to contribute to the science of electrical engineering they will feel amply rewarded.



The Inawashiro Hydro-Electric Generating Station and Pipe Lines

There are other questions connected with the utilization of electricity in Japan, for example, the problem of railway electrification and the organization of supplies of electric power. At the present time all the tramcars and inter-urban lines in Japan are run by electricity, but the mountainous nature of the country presents obstacles to the development of steam railways. With a view to increasing the traffic capacity and providing additional services the railway board, by whom the nationalized railways of Japan are managed, has made plans for electrifying all the railways and these proposals are at present before parliament. The needs of the present transport situation demand that the railways should be electrified as far as possible. In connection with this project and as a preliminary step the board intends to instal an extensive system of electrical equipment and this will be a decided contribution to the progress, consolidation, and unification of the electrical industry in Japan.

The Philippine Railway, 1920

OPERATING REVENUES.—Total operating revenues for the year ending December 31st, 1920 exceeded those of the previous year by $144,290, or 24 per cent.; freight earnings increased $18,383; passenger earnings $115,549; transportation earnings from other sources $1,695, and incidental revenues $8,663. The increase in revenues is accounted for by the exceptionally good passenger business on both divisions, increased freight traffic on Panay and a raise of 7.7 per cent. in freight rates, and 8.3 per cent. in passenger rates, effective September 1st, 1920. In the past four years increases of 30 per cent. in passenger rates and 40 per cent. in freight rates were secured.

Cebu Office and Station Building, Philippine Railway Co.

OPERATING EXPENSES.—Total operating expenses for 1920 amounted to $531,500 as compared to $396,700 for the previous year. Before the increase in prices brought on by the war expenses amounted to about $250,000 a year. Expenses for the year 1920 have increased 115 per cent. as compared with the year 1916, freight tonnage increased 34 per cent. and passengers carried 59 per cent. Gross revenue increased 92 per cent.

BOND INTEREST.—The interest on the outstanding 4 per cent. first mortgage bonds of the Company amounted for the year to $341,960.00; of this amount, the Company was able to provide from earnings, after appropriating $43,223,88 for addition and betterments, $170,873.71, or 50 per cent., and the Philippine government, in accordance with the contract of guaranty, advanced the balance, or $171,086.29. The total of advances made by the government to December 31st, 1920, to meet interest bonds is $2,888,047.86.

EQUIPMENT.—Equipment purchased during the year was largely confined to shop machinery, the following additions being made :—

Setting up Foundry, Cebu	$ 849.20
One Engine Lathe for Cebu	721.42
Universal Monitor, Cebu	1,844.74
Ryerson Hartz Flue Welding, Cebu ...	1,077.41
Morris Plain Radical Drill, Cebu ...	1,603.21
Bolt Threader, Cebu	565.34
Leblond Lathe, Cebu	1,548.07
Installing New Machinery, Cebu ...	422.88
Saw Mill, Panay	1,149.12
Saw Sharpener, Panay	178.67
Drilling Machine, Panay	536.48
Rivet Heating Furnace, Panay ...	240.67
Electric Light Plant, Panay	1,356.61
	12,093.82

LIGHTERS AND LAUNCHES.—

Lighter *Francisca*, Cebu	$ 3,881.16
Lighter *Cuckoo*, Panay	3,555.66
Lighter *Sapian*, Panay	4,000.00
Launch *Nena*, Panay	5,173.08
Launch *Carmencita*, Panay	10,999.83
	$27,609.73

ROLLING STOCK.—Locomotives, 15; passenger cars, 52; freight cars, 191; construction cars, 6.

The Yellow River Bridge Tenders

Peking Inaugurates Unusual Opening Ceremony

SOMEWHERE else in this issue, on page 425 to be exact, there is a news item in regard to the Yellow River Bridge, which, since its insertion, must be supplemented with the information that the opening of all tenders received took place in Peking on Saturday, the 2nd of July. The days of tender opening in the presence of purchaser and prospective seller only seems to have passed for at the ceremony which took place at the Yellow River Bridge commission building on the second of July there were present the five judges of the commission and a large body of Chinese and foreign engineers. The event is generally recognized in Peking to be one of the most important in connection with the history of engineering in China. Nine nations were represented in the competition which indicates something of the international interest aroused. The spirit of scrupulous fairness and complete co-operation which was shown by the members of the commission created a very favorable impression. The *Peking Leader* reports on the proceedings as follows: "Twenty-two bids in all were submitted, Chinese, American, British, French, Italian, Belgian, Japanese, Austrian and German firms being among those who entered the competition. Of these twenty-two, four were thrown out because the data required in the instructions was not all on hand. One set of the blue prints, photographs, pamphlets, etc., submitted by each competitor was signed by the chairman of the commission, the representative of the ministry of communications and the senior judge. After the completion of these preliminaries, the plans were turned over to the judges for their consideration. The quality of the proposed bridge and the economy in construction will be the determining factors in the decision. It is understood that the deliberations on the plans will be open to the public.

"The highest estimate of cost was Tls. 23,078,000. When this figure was announced there were exclamations of astonishment. The lowest quotations was $5,200,000. The majority of the bids ranged between Tls. 8,000,000 and $9,000,000.

"Considerable regret was expressed that, through delays in the cables and mails, the estimate of costs was not on hand to complete the documents of the bid submitted by John R. Freeman of America. Mr. Freeman's plans included, in addition to the bridge proper, a scheme for controlling the Yellow River.

"It is not definitely announced when the judges will render their decision. All of the plans submitted include many drawings; some are very complicated. Consequently considerable time will be necessary to study them carefully."

FAR EASTERN IRON AND STEEL

THE HSIANGPISHAN IRON MINES.—Reports have reached the united association of the Hupeh people (this association has been organized by the people of Hupeh on account of the mutinies) that at the investigation of General Wang Chan-yuan, the ministry of agriculture and commerce in the capital, has just sanctioned the purchase of the famous Hsiangpishan iron mines from the provincial government of Hupeh by the Sino-Japanese Han-yeh-ping coal and iron corporation of Hanyang.

This means the Japanese interests in central Yangtze have secured another valuable iron property in addition to the iron mines of Tayeh and the coal mines of Pingshiang and it is believed that under efficient modern administration, the output of the Hsiangpishan iron mine will equal to that of the Tayeh product in the course of a few years.

It is true that under Chinese official control, the Hsiangpishan iron mines cannot be worked on a profitable commercial basis; but the people of Hupeh strongly protest to the sale or mortgage of this valuable iron mine to the Japanese or any other foreigners because they want to work it with Chinese capital on a strictly commercial basis with the co-operation and assistance of modern technical advice from western countries.

The members of the provincial assembly in Wuchang have already wired to the Peking government refusing to recognize the deal on the ground that the iron mines of Hsiangpishan are the property of the Hupeh people and do not belong to the Peking government. Owing to opposition, the chief director, Mr. Ho Pei-yun, formerly chief administrator of Hupeh, of the mining bureau, has resigned his post.

* * *

TAYEH IRON WORKS EXEMPT FROM TAXES.—The government has notified the provincial governments to the effect that the Tayeh Iron Works has been exempted from export tax on iron and steel and also for a period of five years from provincial likin and other duties.

* * *

IT is rumored that the Japanese government steelworks, which announced a reduction in price in January, must again lower prices to meet foreign competition. An alternative would be the passage of a bill now introduced into the Diet which will increase the working capital of the ironworks. In the last temporary Diet the exchequer bonds for the use of the government foundry were increased from Yen 20,000,000 to 60,000,000. In a cabinet conference on February 22 it was decided to introduce a bill into the present Diet to increase the floating funds of the foundry from Yen 60,000,000 to 95,000,000.

* * *

A JOINT-STOCK COMPANY has been formed in Chungking for the establishment of an iron foundry. The project is to cost about $2,000,000.

* * *

AKI SHOJI COMPANY; organized with a capital of Yen 200,000, quarter paid up, to engage in the sale of iron, pig iron and steel. Office, 16 Nichome, Imabashi, Higashi-ku, Osaka. Manager, M. Osaki.

* * *

IRON DEPOSIT FOUND IN JOHORE.—Mr. K. Ishiwara, resident of Singapore, had recently located an iron deposit in Johore, in the Straits Settlements, and has obtained a mining concession from the Johore government. He has organized a company with Mr. K. Matsukata and some other capitalists and has contracted with the Japanese Government Steel Works, at Edamitsu, to sell his supply of iron. The deposit is estimated to contain 10,000,000 tons of iron ore.

* * *

A GREAT STEEL DISCOVERY.—A French engineer, M. Basset, is reported to have solved the problem of producing steel direct from iron ore instead of first making cast-iron for subsequent conversion into steel.

This announcement is made by Charles Nordmann, the French scientist and writing on scientist questions. If this becomes an accomplished fact, France, which heretofore has always been handicapped owing to the lack of coal and of coke, which is necessary for metallurgical operations, will be able to turn out all the steel she needs without having recourse to England or to the United States.

To-day France possesses immense beds of iron ore in Lorraine, and produces without difficulty some 10 to 15 million tons of iron ore annually for conversion into steel.

But if France does possess rich iron deposits her steel manufacturers are obliged to import coal from abroad, as that produced in France is not suitable for her blast furnaces.

M. Basset's process is the injection of hot air and coal dust into the furnaces, which permits of reducing the cast iron to a state of fusion in one-sixth of the time at present required.

Experiments on the Basset process are now being carried out, and, according to Professor Nordmann, if successful, will revolutionize the steel industry and will prove particularly profitable to France.

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THE NINIWA IRON WORKS was organized recently at 478 Teunajimura, Tosei-gun, Osaka. Manager, Mr. T. Morikana.

* * *

IRON FOUNDRY ON SHINWA ISLAND, CHINA.—An Anglo-Chinese-Japanese syndicate has been formed with a capital of Y.15,000,000 to establish a huge iron foundry on Shinwa Island, China, where 200 tons of pig iron will be produced per day.

* * *

PRODUCTIONS OF DAHYEN IRON FOUNDRY EXEMPTED.—While the proposal to establish an iron foundry at Dahyen to be placed under the control of Hanyang Iron Works was approved in the Ching Dynasty, the construction of the foundry actually commenced in 1913. Now, the authorities of the iron foundry, which has been nearly completed, requests the ministry of finance to exempt their production from export duty, likin charges and all other taxes for five years from date of inauguration on the ground that most of their products will be exported; the latter has duly sanctioned their request.

* * *

TANAKA IRON WORKS, LTD. organized with a capital of Yen 100,000, one-half paid up, to manufacture machinery and boilers, etc. Office, 233 Sawakamie-cho, Kita-ku, Osaka. Manager, Y. Naito.

* * *

AMERICAN STEEL MANUFACTURERS OUTBID.—Public tenders were asked for by the New Zealand government for 22,500 long tons of steel rails and fishplates, with the result that 10,000 tons were placed with a British firm at £17 0s. 5d. c.i.f. per long ton for steel rails and £21 1s. 8d. per long ton for fishplates. The American bid was £18 gold c.i.f. per long ton for rails and £21 for fishplates.

* * *

JAPAN'S IRON STOCKS.—In view of the fact that there are large stocks of iron in Japan, it is reported that no more iron will be imported from abroad for the rest of the current year.

Last year witnessed a remarkable decrease in the production of iron throughout the world. For instance, England produced pig iron to the amount of 16,260,000 tons before the outbreak of the great European war that is, in 1913, but its production in 1920 totalled only 8 million tons. America is the only exception with an increase of six million tons. Furthere details are as follows :—

PIG IRON AND STEEL.
(In thousands of tons)

	1913	1920	1913	1920
America	309,66	364,03	310,01	407,73
England	162,60	80,08	76,04	90,51
Germany	190,08	70,00	186,48	90,00
France	51,26	32,65	46,20	29,15
Belgium	24,45	11,13	24,28	12,16

During last year, this country imported 995,195 tons of pig iron inclusive of rails and tubes; while the year before last, the imports of pig iron amounted to 661,159 tons. On the other hand, the production of iron amounted to 300,000 tons from the Government Iron Works in Yawata in Kyushu alone. It is true that one-half of the production, that is, 150,000 tons, was placed on the market, the other half being used by the railway department, the home office, and the other government offices. In consequence, the iron market in Japan is subject to fluctuations, being affected by foreign influences.

However, the Government Iron Works has now 196,225 tons on hand-awaiting disposal; while other iron manufacturers have large stocks of iron, the supply evidently exceeding the demand. Such being the case, it is generally thought that no further attempts will be made to import iron from abroad, because it will precipitate another slump in the iron market in Japan.

Engineering, Financial, Industrial and Commercial News

AGRICULTURAL

New Enterprise at Soochow.—An agriculture and pastural company capitalized at $300,000 is being organized at Soochow, Kiangsu, by the local influential personages, Mr. W. S. Woo and several others. This is a new enterprise of its kind in an inland city, and it will be opened as soon as the registration with the industrial commissioner of Kiangsu has been sanctioned.

AUTOS

The Nisshin Automobile Co., Ltd., Japan—Established with a capital of Y.500,000, quarter paid-up, to manufacture cars and attachment. Office, 232 Shichome, Sone-zakikami-cho, Kita-ku, Osaka. Mr. K. Imanishi is managing director.

Omnibus Service, West Java.—A company has been formed to operate an omnibus service in West Java under the name of "Omnibusdienst West Java." While this is not the first omnibus company to be operated in the Dutch East Indies, it is of interest that it is to operate in West Java, as the motor bus is not now in use in that part of the island. There is an opportunity for a large development in this thickly populated island, and it is reasonable to expect that other companies will be organized in other districts.

New Auto-Bus Line, Japan.—The Biyedo Automobile Company, of Fujisawa-machi near Yenoshima has been granted permission to operate a public auto-bus line between Fusamachi and Yoda.

Yokohama-Kamakura Motor Bus Line.—Permission has been granted to Mr. K. Mori to operate a motor bus service between Yokohama and Kamakura charging a fee of Y.1.50 for passage one way.

Yangtze Machinery Works Manufactures Automobiles.—The Yangtze Machinery Works, established at Chanchiachi, below Hankow, some dozen years ago, is rapidly growing an important institution in the manufacturing circles of Hankow and Wuchang. It is now understood that a Cantonese engineer of the establishment has succeeded in turning out an automobile quite comparable to machines manufactured in America and European countries. The works will shortly enter into the business of making cars after the inventor's pattern on a large scale, according to a recent advice from Hankow.

The Maruwa Industrial Co. was organized recently to do a business in automobiles. Office at 2440 Kameyedo-machi, Takyo-fu. Representative: Mr. D. Takeda.

AVIATION

The Tokyo-Changchun Test Flight.—Four Japanese planes will participate in the experimental flight from Tokyo to Changchun. The machines are of Japanese make and will start from Japan across Korea, thence to Fengtien and finally to Changchun whence they will return by steamer to Japan. The flight is postponed indefinitely.

Aircraft Factories, Japan.—The Mitsubishi Company and the Kawasaki Dockyard Company have decided to enter the aircraft business, and several English engineers engaged by the former company have arrived in Japan to supervise the factory being erected at Kagamiga-hara. The Kawasaki Dock Company have purchased 50,000 *tsubo* of land at Inaba-gun, Gifu prefecture, near Kagamiga-hara for the erection of a similar plant.

Seaplanes on Upper Yangtze.—A scheme is being launched to start a seaplane service between Ichang and Szechuan ports.

Funds for New Work: China.—General Ting-Chin, chief of the aviation bureau, is working for a revival of the aerial loan question which was pigeon-holed, in view of the difficulty of securing funds. He is said to be anxious to obtain a sum of two million dollars on the security of the aerial route between Peking and Shanghai.

BUILDINGS

A New Museum.—A donation of one million yen for the construction of an art museum in Tokyo, has been made by Mr. Keitaro Sato of Fukuoka prefecture, Kyushu.

New Railway Hospitals, Japan.—Two new railway hospitals will be built, one at Sendai and the other at Nagoya, at a cost of Y.410,000.

Reformatory for Korea.—The government general of Korea has decided to establish a reformatory for juvenile prisoners in Kaijo, Koiki province. It is to cost $250,000 and will be ready in March, 1922. The building will house 500 persons.

Erections for Customs at Swatow.—Late last year an American firm began work on a large construction contract for the maritime customs. Under construction are the examination shed, administrative building, and 14 residences for staff at a cost of about Tls. 280,000. This represents only about one-half of the work planned, the contract for the remainder having recently been obtained by the same firm. The buildings are being made of reinforced concrete. It is possible that the advantage of such construction in this region, where white ants abound and do much destruction to timber and which is occasionally visited by earthquakes, will be appreciated by the Chinese and be adopted for the better class of buildings. Several foreign-owned buildings have recently been built of reinforced concrete. Native construction is hopelessly faulty as the 1918 earthquake proved.

British Consular Buildings in China.—The house of commons has agreed to a vote of £53,515 on the acquisition of a site for the erection of a new consular building at Tientsin, and £27,000 for the erection of a new consulate and residence at Harbin.

A Girls' School at Yokosuka.—On a site recently purchased for Y.50,000 a girls art school will be constructed at Yokosuka city.

A Commercial School.—Y.130,000 have so far been subscribed for the establishment of the Yokohama Higher Commercial School.

Proposal to Build Governmental Buildings.—The beauty of the Tokyo imperial palace will be greatly damaged by the loss of the moat outside the moss-grown rampart from Wakakura gate to Sakurada gate and the construction there of imposing buildings for the government offices, planned by Doctor Okuma, technical engineer of the temporary officer of the construction of the new Diet building, reports the *Chugai Shyogo.* According to the loan proposed by the doctor the moat will be filled up for the central seat of the government offices, the city office of Tokyo and the meeting hall for citizens in Tokyo.

The paper says that the proposal has already been approved by the city planning bureau of the home department, the only objection being raised by the department of imperial household on the superstitious grounds that the moat in question is situated in the direction of "Snake and Dragon" (Southeast) of the palace. It is estimated that the plan will be completed within 10 years.

Modern Railway Hotels, China.—Another imporvement in railway affairs can be recorded by the decision of the Chiaotung Pu to establish modern railway hotels, on lines similar to the Yamato Hotels on the south Manchuria railway, on several Chinese lines. On the Peking-Mukden Railway these hotels will be opened at Tientsin, Tongshan, Peitaiho and Shanhaikuan; on the Peking-Suiyuan line at Nankow, Kalgan, Tatungfu and Suiyuan; on the Peking-Hankow line at Hsiling, Chikungshan and some other stations that have not yet been selected; on the Tientsin-Pukow line at Tsinanfu, Taian, Chufu and two other stations yet to be chosen; and on the Shanghai-Nanking-Ningpo railway at Nanking West and Ningpo.

T. K. K. As Hotel Proprietors.—It is reported from Tokyo that the Toyo Kisen Kaisha contemplates spending no less than Y.20,000,000 on the construction of hotels—one at Tokyo and one at Yokohama, while the Oriental Hotel at Kobe, which is owned by the T.K.K. will probably have two or three stories added.

A Central Railway Station, Peking.—It has been decided to put into operation the plan for the construction of a central railway station near the Temple of Agriculture and the chief engineer of the Peking-Hankow Railway has been instructed to carry out the survey. The cost of construction is estimated at $3,000,000.—*Reuter.*

BRIDGES

The Yellow River Bridge.—The government has been advised by Minister Wei Chen-tsu from Brussels to the effect that the Belgian engineer who has been engaged for the Yellow River Bridge commission of the Peking-Hankow Railway cannot arrive in China in time within June, so that he suggests that the date for the opening of the tenders for the reconstruction of the said bridge should be postponed to the 31st July, 1921. This suggestion is under the consideration of the ministry of communications. It is reported that at the request of the Japanese legation, a Japanese railway engineer will be appointed to the Yellow River Bridge commission of Anglo-French-Belgian-Chinese engineers by the Chinese government.

New Bridge, Japan.—The famous Seto-noi karahasi bridge crossing Laka Biwa near Kyoto is to be rebuilt at an estimated cost of Yen 420,000. Temporary work was commenced in April.

Bridge Reconstruction, Japan.—The Sagambridge in Kanagawa prefecture will be recon-

structed under contract by Mr. Namba and the Sakai bridge in the same prefecture by Mr. S. Kajima.

New Bridge Planned, Bangkok.—The project to link up the northern and southern state railways of Siam is receiving very favorable consideration, and will involve the construction of a bridge over the river at Bangkok, which at that point is about 50 feet deep and 600 feet broad.

Canton Planning Bridge Construction.—The provincial assembly of Kwangtung propose constructing a bridge between Canton city and Honam (opposite to Canton on the opposite bank of the river).

Sydney, Australia, to Invite Tenders for North Shore Bridge.—The engineering department of the Metropolitan Railway Construction is preparing plans and specifications for the Sydney (Australia) Harbor North Shore Bridge, which is to form an integral link in the loop system of electric railways running into and around the city and will also provide for vehicular and pedestrian traffic. The cost of the bridge at pre-war prices would have been in the neighborhood of £2,500,000 to £3,000,000. It was proposed to add somewhat more than half of the cost of the bridge to the capital cost of the railways, the balance to be charged against the city of Sydney and the municipalities and shires on the northern side of the harbor, to be liquidated by a tax on the unimproved capital value of these areas. It was hoped that parliament would pass the necessary enabling act so that a worldwide call for tenders on these specifications might be issued about October, 1921, the tenders to be returnable a year later, thus giving about 12 months for contracting firms to prepare their bids.

COMMERCIAL

New Merchant House, Japan.—The Toyo Trading Company was organized recently to conduct a business in oils and machinery. The capital of the firm is Y.50,000 and their office is at 17 Hackikau-cho, Kyobashi-ku, Tokyo. Mr. I. Imanishi is the manager.

A General Merchant Business, Japan.—To sell machines, general hardware and other things the firm Fujita & Co. has established itself at 3 Shichome, Matosuki, Ya-cho, Kyobashi-ku, Tokyo, with Mr. T. Fujita as representative.

Importers of Machinery, Japan.—The firm Asanuma & Co. established itself recently at 3 Gochome, Kabiki-cho, Kyobashi-ku, Tokyo, with Mr. K. Asanuma as representative to import construction material, machines and tools, and copper and steel.

Dealers in Explosives, Japan.—The Dainihon Juho (Gun) Company Ltd. was organized recently to sell powder, guns and cartridges. Their office is at 19 Nakasarugaku-cho, Kanda-ku, Tokyo, under the management of Mr. Y. Sotome.

The Kado Information Co.—Established at 13 Nichome, Kobiki-cho, Kyabashi-ku, Tokyo. Manager : Mr. K. Shimada does a general printing and advertising business.

The Chugai Lumber Co. was organized recently with a capital of Y.250,000 at 5 Itchome, Uchisai-wai-cho, Kajimachi-ku, Tokyo, with Mr. K. Ogimachi as manager to do business in lumber.

Sankyo & Company.—Organized for export and import of Chinese products. Office, 5431 Shinpoin-cho, Tennoji, Osaka. Manager : Y. Maeda.

Beet Sugar in North China.—M. Y. San, who plans to erect soon a million dollar sugar refinery, is starting a movement for the cultivation of sugar beets in North China. Recent investigations have proved that the crop offers large possibilities and Mr. San has employed two Chinese experts to write literature dealing with the raising of the product. Selected beet seeds are being distributed from the M. Y. San store on Nanking Road, Shanghai.—*Millard's Review.*

A New Sino-American Trading Company.—The Far East Trading Company Inc., incorporated under the laws of the United States in force in China and capitalized at Shanghai Tls. 200,000, will be located in the "Fetco" building, 62 Kiangse Road, and branch offices will be opened in San Francisco, New York, London and Paris.

The incorporators and officers of the company are : F. G. Boulon, president : H. L. Ford, vice-president, and H. D. Rodger, secretary and treasurer.

Several prominent and influential Chinese merchants have associated themselves with this new company, the most important being Mr. Shen Ling-fong, chairman of the Chinese Silk Guild, and Mr. Choa Erh-kang, general manager of the Yung Chong Match Factories.

The Nitto Belt Manufacturing Co. was organized recently to manufacture machinery belts. Office: 340 Nichome, Kamifukushima, Osaka. Manager : Mr. U. Shimada.

The Hasegawa Shoten Company was organized recently to do a general import business. Office : 5 Nichome, Kitahoriye, Nishi-ku, Osaka. Manager : Mr. T. Hasegawa.

The Asahi Printing Company, Ld. was organized recently with a capital of Y.200,000, quarter paid up. Office : 6 Gochome Yedobori, Nishi-ku, Osaka. Manager : Mr. R. Kumagaya.

The Kishimoto Shokai Company was organized recently to sell machinery. Office : 933 Taikai-cho, Nishimoda, Osaka. Manager : Mr. K. Yoshizawa.

The Yamada Shoten Co. was organized recently to sell construction apparatus. Office : 1 Nichome Mitoroshiro-cho, Kanda-ku, Tokyo. Representative : Mr. I. Jujii.

DEVELOPMENT

New Medical Laboratory at Tokyo.—The first medical laboratory ever established in Japan for the combined purpose of theoretical and clinical research will be built close by the famous Sato Juntendo Hospital at Ochanomizu, Hongo, under the name of the Juntendo Medical Laboratory.

The building will be two-storied, and constructed of reinforced concrete, covering an area of some 300 *tsubo*. The work will be completed within this month at a cost of Y.300,000, internal equipment will not be ready for use before twelve months.

Bunding, Road and Tramways for Swatow.—During last year the local government instituted a bunding and foreshore reclamation project at Swatow. A bunding bureau was created for carrying out the work. Surveys and plans were made by Japanese experts and recently a Cantonese firm procured the contract for the construction of the bund and for the reclamation work, involving, it is claimed, an expenditure of over $2,000,000. An 80-foot road along the bund is to be built and a tramway is projected. If the undertaking is properly carried out it will prove a great boon to the port.

New Development Project, Korea.—Hon. K. Hayashida and others have purchased land in the vicinity of Rashin, Kankyo north province, to the extent of 8,000,000 *tsubo*, and will organize a land company for its development.

Reclamation Work, Japan.—20,000 *tsubo* of ground will be reclaimed at Tauramachi, Miura-gun, Kanagawa prefecture.

Big Chinese Corporation is Organized.—A new Chinese corporation, the Fung Sheng Industrial and Commercial Development Corporation, will open for business at 35 Szechuen Road next to the Han Yeh Ping Co. Building, Shanghai.

The new corporation is capitalized at $2,000,000 more than half of which have been already paid up, represents the entry, on a substantial scale, of leading Chinese financiers into modern lines of business hitherto neglected by them, and its inauguration at this period of business depression reflects the confidence of these men in the future prospects of trade.

The promoters and shareholders represent leading business men and capitalists in this country. Chin Yung-peng, the premier : Pan-fu, the vice-minister of finance; Sun Pao-chi, director of the inspectorate-general of customs; Lu Yung-hsiang, the tuchun of Chekiang; Fu Siao-en, managing-director of the China Merchants' Steamship Navigation Company; Shen Lien-fang, chairman of Steam Filatures and Cocoon Merchants' Guild; Sui Meng-ken, managing-director of the Peking-Suiyuan Railway; James H. Lee, Dr. Z. T. K. Woo, general superintendent of the Hanyang Works; and E. Y. Edward Sheng are among the chief shareholders.

The original aim of the promoters was to organize a firm, with shares of no par value technically equipped to undertake the development and management of the vast real estate holdings, industrial plants, mines, and stocks and bonds under their ownership or immediate control.

Later, with the infusion of other business men and realizing the opportunity of a general company to undertake construction, stocks and bonds, real estate mortgages, insurance, storage warehousing and industrial financing business, they threw open the subscription to a large public and made it into a limited joint stock company controlled by a group of purely business men. Besides the personal support of the shareholders, the corporation is closely affiliated with a group of strong banks, capable of taking care of any large project it may undertake.

The moving spirit of the enterprise is the managing-director of the concern, Mr. E. Y. Edward Sheng. Mr. Sheng, who is the oldest son of the late Sheng Kung-pao, is concurrently the assistant general manager of the Han Yeh Ping Iron and Coal Co., Ltd., president of the Commercial Bank of China, president of the Wah Foo Commercial and Savings Bank, superintendent of the Chinese American Bank of Commerce, and is on the directorate of many other large business enterprises.

Mr. Y. S. K. Su, one of the assistant managers, is a son of Tuchun Lu Yung-hsiang.

The other assistant manager, Mr. James H. Lee, vice-president of the Wah Foo Commercial and Savings Bank, and is the president and promoter of a chain of electrical plants in many of the interior cities.

The board of directors of this company consist of Messrs. Chien Nun-shun, Y. S. K. Liu Pan-fu, Yao Moo-lien. Shen Lien-fong, Sui Meng-kun, Fu Siao-en, James H. Lee and E. Y. Edward Sheng.

A New Tokyo Planned.—It is reported that Baron Goto, mayor of Tokyo, will begin a series of public lectures the latter part of this month in support of his plan which he has outlined for municipal administrative reform and for the building of a greater Tokyo.

According to the plan which he has just made public he has outlined a program which will take 15 years to complete and will require an expenditure of Y.800,000,000. Under his plan he would reconstruct all the streets of Tokyo and install a complete sewage system and carry out many other drastic changes which are essential to the improvement of the city. The expenditure involved is so enormous that to realize the plan the active support of all the citizens of Tokyo is required.

According to the assistants of the mayor he plans to give a series of lectures in each ward explaining his plan and showing the many advantages which are to be had from such a plan. Many prominent men are reported to have agreed to aid in the movement of getting the plan before the public and to give it their support.

The Hua Shen Industrial Co. is being organized by prominent men in Shanghai and Chekiang province with a capital of $2,000,000 silver, to

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conduct agricultural, industrial, commercial, mining and electrical pursuits. Its head office is in Shanghai.

City Planning Commission Formed, Canton.—The municipality has formed a city planning commission under the department of public works for the purpose of studying and preparing a program of city planning for the city of Canton. The commission consists of nine members with the commissioner of public works, Mr. T. K. Chong, as chairman. The other members are the three divisional chiefs and two other engineers of the public works department. Besides there are three foreign engineers invited by the mayor to become honorary members of the commission. This commission is chiefly of a technical nature. The members will meet at such times as to be announced by the chairman and they will hold meetings at the office of the public works department. Mayor Sun Fo has invited Messrs. Paget, Wier and Olivecrona, to be the honorary members of the commission. All those gentlemen are noted foreign engineers in the city. Mr. Olivecrona is the chief engineer of the Kwangtung conservancy works.

Saghalien Improvements.—In the autumn o 1920 the Japanese started making a railroad from Alexandrovsk to Onora to establish communication with Japanese Saghalien. The work is being done by Japanese workmen specially brought from Japan, and the Russians are only employed to attend to horse haulage. In the winter the Russians got remunerative employment in carting stores from Alexandrovsk to Onor, Rikovsk, Timovo, etc.

This summer the Japanese intend to set to work and alter the course of the river Alexandrovka, and after levelling the present course of the river construct on it the future town. As trade with Saghalien is free of duty, many Japanese shops have opened and are dealing chiefly in rice, flour, manufactured goods and other Japanese products, but at the same time Russian trade exists and meets with no opposition on the part of the Japanese authorities. Trading is done exclusively in yen, and no Russian money is in circulation.

Manchu-Mongol Development.—Through Sino-Japanese co-operation, an important organization, which is called the North-Eastern Industrial Development Association, has been formed with its headquarters in Mukden and a capital of twenty million dollars. The object of the Association is to develop natural resources in Manchuria and Mongolia, for instance, the cultivation of rice and wheat, the felling and planting of trees in the Changpei and the Hsinan mountains.

The S. M. R. Co.'s Fresh Enterprises.—The sum of Y.12,000,000 has been appropriated by the South Manchuria Railway Company for the new fiscal year as the fresh enterprise funds of the local administration department. Of this amount, Y.2,600,000 is for electricity works, Y.1,300,000 for gas works, Y.3,800,000 for public works, Y.1,000,000 for hospitals and other hygienic works, and Y.2,000,000 for educational purposes.

The construction of the rest of the local hospital buildings on their site above the S.M.R. Co. general offices will be undertaken on a three years' program, and during the current fiscal year, the foundation work will be completed. Hospital buildings will be erected anew also at Wafangtien and Tashihchiao, to be finished to a major extent during this year. Of the public works in project, the chief items are the enlargement of the Antung waterworks, and the extension of the iron pipes for Antung, Fengtien (Mukden), and Changchun.

Tin and Oil Enterprise: N. E. I.—There has been a marked increase lately in the volume of emigration traffic from Hongkong to the Netherlands East Indies, where the extensive exploitation of tin and oil mines, and sugar and coffee plantations has created an unprecedentedly big demand for Chinese laborers. It has been found necessary for the purposes of recruitment of the coolies there, to come into an arrangement with the local branches of the Java-China-Japan Line, Netherlands East Indies Bank, the Holland-China Trading Company and, as the usual passport regulations have been waived for the benefit of the coolies, no difficulty has been encountered in maintaining a steady flow of emigration traffic to the Dutch colony. The number of emigrants leaving there by the J.C.J.L.'s steamer is over 1,000 every month. The majority of the coolies now proceed to the East coast of Sumatra where laborers are in great demand.

Industrial Developments: China.—In discussing industrial developments in China, Mr. Arnold notes that American machine works, electric, engineering and shipbuilding companies have opened headquarters in Shanghai and are planning to keep trained technical men at the offices. Plans for the Tsinan waterworks project are being made, and when completed the firms which have been interested will be asked to make tenders. The Chinese are reported to be seeking American participation in the development of the island of Hainan. Under date of March 12, Mr. Arnold reports that the Amoy Tinning Co. and the China Canning Co., Amoy, are planning to enlarge their plants with more extensive connections abroad. The Japanese cotton spinning industry at Tsingtao is developing very rapidly, with 50,000 spindles in operation and 200,000 more in view.

Irrigation Project at Foochow.—Consul Hanson is authority for the information that a company called "Farm Improvement and Irrigation Co." has been recently organized at Foochow, with a capital of $300,000 Mex. ($177,000 U.S. currency). It is planned to irrigate about 3,000 acres of rice paddy fields, and pumping machinery costing about $10,000 Mex. has been ordered from an American company. Electricity is to be used to operate the pumps. Fields will be irrigated by the company upon the payment of a charge of $6 Mex. per acre per year.

New Industrial Enterprises in Burma.—Vice-Consul Thorling believes that it is possible that contracts for supplies may be made available for American bidders by the new Burma Finance and Mining Co. (Ltd.). The directors of this company are prominent Britishers, most of them also directors of the Burma Corporation, which company employs a large number of American engineers and draftsmen at its mines and also procures a considerable amount of supplies for its mining operations from the United States. The Burma Finance and Mining Co. (Ltd.), organized 11 months ago, has done a good deal of exploration work in the northern and southern Shan States and in Lower Burma. Options have been acquired over two promising tin properties that are now being developed and concessions have also been applied for covering other new discoveries. The government of Burma has granted the company four concessions on the Tenasserim River covering some 10,000 acres, in which apparently important deposits of coal occur.

ELECTRICITY

Tiehling Electric Light.—A proposition has been raised among the Chinese to establish an electric light works.

New Electric Supply Works, Japan.—Electrical supplies are to be manufactured by Shoji & Company of 10 Hinode-cho, Shibauru, Shiba-ku, Tokyo. Representative: Mr. S. Shoji.

The Maruzen Shokai Company was organized recently to manufacture electrical machines and tools. Office: 14 Nichome, Hama-cho, Nihonbashi-ku, Tokyo. Representative: Mr. I. Yanagisawa.

The Kyokko Electric Company was organized recently at 18 Nakanegishi-machi, Shitaya-ku, Tokyo, with Mr. T. Masuda as representative, for the purpose of engaging in the electricity business.

A Business in Electrical Supplies, Japan.—Establishing themselves at 18 Nakanegishi-machi, Shitaya-ku, Tokyo, with Mr. T. Masuda as representative, the Kyokko Electric Company will conduct a business in electrical supplies.

New Electrical Dealers, Japan.—As sellers of general electrical apparatus the firm Shoji & Company has been established at 10 Hirode-cho, Shibaura, Shiba-ku, Tokyo, with Mr. S. Shoji as representative.

Electrical Supplies, Japan.—To conduct a general electric business the Fuji Electric Company whose capital is Y.100,000, quarter paid up, has established itself at 3 Ura Sarugaku-cho, Kanda-ku, Tokyo, with Mr. E. Yamakawa as manager.

A Penang Scheme.—An electrical engineer at Penang has evolved a scheme of railless electric traction in order to solve the transport problem. He has submitted the scheme to the municipal commissioners.

The Asahi Electric Industrial Co., Osaka, Japan.—This company was organized recently at Sanchome, Horiye-shita, Nishi-ku, Osaka, to do a general business in electrical apparatus.

Urai Electric Manufacturing Co., Ltd.—Organized with a capital of Yen 500,000, quarter paid up, to manufacture general electrical machines and accessories. Office, 391 Minami Urai, Sagisugun, Nishinari, Osaka. Manager: K. Kishira.

New Hydro-Electric Plant, Japan.—The imperial railway department is planning to construct a great hydro-electric plant at Niiagata prefecture using the water power of the Shinano River. The plant will have a capacity of 84,000 kilowatts and will operate a section of 200 miles of line. It is expected to be in operation in 1926.

New Electric Plant, Jagna, P.I.—The Philippine legislature has granted a franchise to the municipality of Jagna, province of Bohol, to install, operate and maintain, etc., an electric light, heat and power system.

New Electric Enterprise, Taiwan.—The Taiwan Electrical and Industrial Co. (Ltd.) was organized in April, 1921, with a paid-up capital of Yen 6,000,000. The company is to supply power from its hydro-electric plant at Giran to the Taiwan Electric Power Co., which has the sole right of power and light distribution in Taiwan. Later it is to undertake the production of cement, lumber, pulp and other commodities to the manufacture of which electricity may readily be applied.

Huge Electric Project, Japan.—Mr. Z. Yasuda, H. Okawa, S. Wakao, and S. Asano are planning to organize a new electric company to be known as the Tokyo Denryoku Company. The capital which was originally set at Yen 50,000,000 is to be raised to Yen 100,000,000. The basis of this new company is the amalgamation of the Kanto Hydro-Electric Company, Capital Yen 17,000,000, managed by the Asano interests, the Abuluma Hydro-Electric Company, capital Yen 10,000,000 and the Yokiwa Hydro-Electric Company, capital Yen 10,000,000.

To Work Plant by Electricity.—It is reported in the iron trade that the Government Steel Works at Yawata is contemplating the plan of electrifying its plants by degrees for the purpose of saving labor and expenses.

New Plant in Philippines.—An act authorizing the municipality of Naga, province of Camarines Sur, to acquire and operate an electric plant within its territory and form a corporation, if necessary, and for other purposes, has been approved.

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is made up especially for circulation in the interior of China, where mails are infrequent and postage expensive. It reaches all the Consular, Customs and Postal Officials and foreign residents in the interior.

Electrification of Philippine Railroads.—In regard to the plans of the Manila Railroad Co. for the use of electric motive power on its road, the bulletin of the Philippine government commercial agency in New York states that the electrical power will be developed from the Agno River, in central Luzon, which is believed to possess a potential capacity of from 12,000 to 15,000 horsepower. A thorough topographical survey of the entire water-power site is being undertaken, and early reports of the survey would seem strongly to point to the feasibility of the project.

Electrical Developments in Foochow.—Consul Hanson reports from Foochow that local Chinese are interested in the organization of a hydro-electric plant to develop power from the Min River, with a proposed capital of $5,000,000, and American participation is invited.

New Electric Works for P. I.—An act granting to Geronimo Lasala and Emigdio Borja a franchise to install, operate, and maintain an electric light, heat, and power system in the municipality of Sorsogon, province of Sorsogon, Philippine Islands, has been approved by the legislature.

A Lighting Project in the F. M. S.—The chief secretary F.M.S. has approved the appointment of the director of public works (chairman), the general manager for railways, the senior warden of mines to constitute a board for the supervision of all schemes for electric lighting and electric supply throughout the Federated Malay States, and for the direction of all investigations in connection with such schemes. Mr. J. C. M. Matthews, electrical engineer, Selangor, is appointed secretary to the board.

Chinese Government Interested in New Electric Light Plants.—Need of electric power in North China and especially in Peking and Tientsin has become so pressing that the government is taking a serious interest in plans to keep pace with the needs.

Formosa Electrical Industry Company.—The company which was organized on May 2, has appointed as managing director, Mr. J. Nagate. Seven other directors were named at the same meeting.

Electrical Enterprise, Japan.—The report of the communications department for February, 1921 says there are 822 electric companies in Japan with an aggregate capital of Yen 1,318,517,861.

INDUSTRIES

Industrial Exposition, Tokyo.—An industrial exposition has been decided upon the Business Men's Society of which Baron Goto is president to take place at Okazaki Park, Kyoto, from July 5th to September 5th.

Spinning Combine, Japan.—The Toka Spinning Mill and the Chuka Woollen Company have recently amalgamated.

New Clock Factory, Japan.—Clock manufacturing is the intention of a group of merchants in Osaka who have subscribed Y.300,000 to form a company for so doing and to purchase the electric clock patent of Mr. Takaya.

Moving Picture Combine, Japan.—Cinematograph production in Japan is to receive impetus by the amalgamation of the Shochiku Kinema Company and the Shochiku Partnership Company with an increased capital of Y 5,000,000.

The Waseda Printing Company opened offices at 362 Tsurumaki-cho, Ushigome, Tokyo, with Mr. T. Ioka as manager.

Zinc Manufacture, Japan.—The Sakuma Zinc Manufacturing Co. has been established at 2635 Terashima Mura, Tokyo-fu, with Mr. M. Sakuma as representative, to conduct a business in zinc.

Construction Material Manufacturers, Japan.—To manufacture asphalt, cement, brick, to cut lumber and stone, the Nihon Road Construction Material Manufacturing Co. has been formed at 2 Kotohira-cho, Shiba-ku, Tokyo, whose representative is Mr. K. Koide

New Flour Mill at Chaokaidu.—An Anwher merchant, Mr. Kung, has decided to erect a flour mill at Chaokaidu with a capitalization of $300,000. After the company is organized, registered with the ministry of agriculture and commerce, and accorded to protection by the local magistrate, the work of building and installation of machinery will be begun.

Celluloid Manufacture, Japan.—With the credit for the encouragement of industries, it is announced, the ministry of agriculture and commerce purchased up to the close of the financial year 1920/1921 six new machines in Europe and America, for which purpose the department dispatched an expert to those parts. They include a complete set of celluloid comb manufacturing machines, a complete set of brush manufacturing machines and others.

Industrial Development, Nantungchow.—Nantungchow, advertised as a model city, will this year carry out the installation of an oil mill, paper mill, electricity plant, soap manufactory, road building, long distance telephone, and other industrial enterprise from the proceeds of a fund of two million dollars to be raised by floating $2,000,000 local public loan bonds at 8 per cent. interest to be redeemed in 16 annual payments commenced from the fourth year from the date of issuance. This plan was proposed by Mr. Chang Chien and his brother and passed by the local self-government association. It is expected that sum can be raised before June 30th, 1921.

Sakata Iron Works.—Organized to conduct a general foundry and machine shops. Office : 986 Itchome, Inari-cho, Minami-ku, Osaka. Manager : T. Sakata.

Kumamoto Paper Mills, Ltd.—Organized with a capital of Y.550,000 to manufacture paper. Office : 29 Nakano-cho, Taihoji-machi, Minami-ku, Osaka. Managing Director : Y. Yano.

Takahashi Dye Manufacturing Co., Ltd.—Organized with a capital of Y.1,300,000, one half paid up, to manufacture dyes and chemicals. Office : 1 Toyosa ki-cho, Nishinari-gun, Osaka. Managing Director : K. Kishi.

Nippon Spindle Manufacturing Co.—Organized to manufacture spindles for spinning machines. Office : 46 Nishikamiden, Urai, Sagisu-cho, Osaka. Manager : Z. Yoneya.

Nagayasu Shoten Company, Ltd.—Organized with a capital of Y.200,000 for the sale of machinery and tools. Office : 17 Sanchome Kita-dori, Takeuri-bori, Nishi-ku, Osaka. Manager : S. Nagata.

Sakai Brick Company.—Organized for the manufacture and sale of bricks and construction materials. Office : Tojo-mura, Minami, Kawashi-gun, Osaka. Manager : T. Inamoto.

Teikoku Motor Manufacturing Co.—Organized to manufacture petroleum motors. Office : 118 Taniyama, Osaki-machi, Shinagawa, Tokyo. Manager : T. Kasa.

Nitrogen Factory, Japan.—For the purpose of purchasing the German patent rights for the extraction of nitrogen from the air, the following interests have combined to furnish the capital :—The Mitsubishi, Mitsui, Sumitomo companies, Mr. Hara and Baron Furukawa.

Yotsudomi Glass Factory.—Organized to manufacture glass bottles and other glass ware. Office : 381 Itchome, Kitadoshin-cho, Kita-ku, Osaka. Manager : S. Yotsudani.

Okutahatanaka Stone Company.—Organized for the handling of building stone and construction materials. Office : 844 Ichioka-cho, Nishi-ku, Osaka. Manager, T. Okuda.

Brickmaking, Mukden.—There are 30 kilns in Mukden operating seven months in the year, exclusive of winter. The larger kilns have a monthly output approximating 100,000 and the smaller ones 50,000, the average annual manufacture reaching about 13,000,000 bricks. The present cost is about $8.50 per thousand at the kiln. Lack of sufficient capital obliges operators continually to negotiate loans at high interest in advance of the working season, and as a result the returns are often barely sufficient to meet expenses.

Concrete Block Machinery, F. M. S.—The manufacture of concrete blocks, with which concrete houses may be built with speed and economy, is attracting much interest in British Malaya as means of relieving the house shortage. Several municipal bodies are erecting the necessary plant for turning out these blocks.

Arsenal Activity.—The Peking government has telegraphed to the Tehchow Arsenal to manufacture 500,000 rounds of ammunition and to the Hanyang Arsenal to manufacture 5,000 rifles. It is learned that these munitions will be supplied to the Kwangsi-ites.

North-Eastern Industrial Company.—The Chinese-Japanese North-eastern Industrial Company with its main office at Fengtien has been organized with a capital of $20,000,000. The aim of the Company is to exploit the natural resources of Manchuria and Mongolia. Its field of activities will include mining, afforestation, cereal plantation, etc.

Paper Mill for Ipoh.—A large paper mill is to be erected by several American promoters in the vicinity of Ipoh, British Malaya. The necessary machinery will probably cost over a million dollars. The mill will have not only the local market to supply but an almost unlimited export trade to develop.—*Commerce Reports.*

Siberian Markets.—For the last two weeks local Russian firms in Vladivostok have been receiving letters from American firms inquiring about the local market situation, and the prospects for the sale of goods of American manufacture. The trade depression in the domestic market of America induces the big manufacturers to seek Far Eastern markets for their commodities. Among the goods offered were agricultural implements, lumber equipment, etc. Many companies are willing to extend credit to Russian firms, and, prompted by their desire to sell, they are making very attractive offers.

Cotton Mill Development, Shanghai.—An addition to the long list of cotton mills now in existence is a new plant that is soon to be installed at Pootung, the building occupying 40 *mow* of land. The mill is to be equipped with 100,000 spindles of Chinese manufacture and the engine and motors have been ordered from a German firm. The mill also plans to install 800 hand cotton gins and twenty to be operated by oxen. Operations are expected to begin during August.

Cotton Spinning in Manchuria.—A cotton spinning and weaving factory has been started in Mukden known as the Spinning & Weaving Company, Ltd., of the three eastern provinces. The capital is $1,000,000 in 100 shares of $10,000 each.

Hangchow Satin Weaving.—Within the past ten years the satin weavers of Hangchow have profitted enormously by the adoption of foreign weaving machinery. There are now more than

140 weaving mills with 8,400 machines in operation producing an aggregate total of $16,000,000 worth of satin annually. Besides the chief domestic market of Peking, Tientsin, Canton, Hankow, Shanghai, and Yangtze River points, the satin is finding its way into foreign countries.

Chino-American Engineering Corporation.—The Chinese Engineering and Development Company of Peking has filed articles of incorporation in the United States Court for China here.

The new company is incorporated to engage in general engineering and contracting for building construction and for the production of building materials, its capitalization is G.$100,000 divided into 1,000 shares of a par value of $100 each. It is to begin activities with paid in capital G.$10,000.

The incorporators are: Messrs. S. C. Thomas Sze, Yang Pro-ling and H. A. Raider of Tientsin, Murray Sullivan and Thaddeus C. White of Peking and C. L. Seitz of Shanghai.

New Industrial Enterprises in Shanghai.—Dr. C. T. Wang and Mr. C. C. Nieh, Chinese cotton magnate, are undertaking to organize a dye staff company at a total capital of $1,000,000 with an American dye stuff company named Heng Sin in Chinese as a joint limited corporation. At the beginning four-tenths of the total capitalization will be paid up, which is to be subscribed by Chinese and American capitalists in equal shares.

A New Filature under Organization, Chekiang.—A model filature, capitalized at $500,000, is being established in Chekiang. Possibly it will be situated at Hangchow, capital city of Chekiang province. An amount of $50,000 has been subscribed by the military governor of Chekiang, Gen. Lu Yung-hsiang, and $150,000 has been subscribed by the local influential personages.

A New Company, Kashing.—A socks and stockings manufacturing company has been lately established at Kashing, Kiangsu, at a capital of $2,000 by Mr. C. C. Loh and Mr. Y. F. Chang.

Soya Bean Oil for Export: Mills.—Consul Jenkins at Harbin reports that a Chinese manufacturer of soya bean-oil is anxious to get in touch with American oil importers through him, hoping to bring the leading Chinese oil crushers into an export association, with the object of shipping direct to consumers in the United States. There are 32 bean-oil mills in Harbin, with an approximate total of 1,900 presses. Most of the soya bean-oil from Manchuria now reaches the United States by way of other countries.

COMMERCIAL FINANCE

Industrial Investments, Japan.—The Takatus Trust Company, Ltd. recently organized with a capital of Y.2,000,000 at 1 Setomono-cho, Nihon bashi-bu, Tokyo, with Mr. R. Takatsu as managing-director, will make investments in general enterprises.

New Chinese Trust Co., Shanghai.—The first Chinese trust company capitalized at $8,000,000, is being established by the prominent merchants of Peking, Tientsin, Shanghai and Hankow, Messrs. Sun Mo-han, Ha Han-chong, Li Sung-ching, Li Yung-shu, Chu Pao-san, Yu Yat-ching, Wen Lai-ting and Chow Pei-cheng, at Shanghai. The total capitalization is divided into 160,000 shares and will be paid of which one-fourth has been paid-up.

New Bank for Peking.—A new Sino-Japanese bank, called the Tatung Bank, is to be inaugurated. Ho Hai-min, Lin Jui-teng, Ho Teh-lin and Lin Shih-chen are representing the Chinese capitalists, and the total capital paid up is $5,000,000.

Restrictions on Foreign Capital.—For the purpose of preventing disputes with foreign governments, the Peking government has just wired to all the provinces stating that without previous official sanction, no Chinese shall be permitted to use foreign money for the establishment of telephone and electric light companies.

A Trust Co., Shanghai.—A Chinese trust company to be capitalized at $10,000,000 is being organized at Shanghai by local influential merchants under the leadership of Mr. Yo Cheng-pao.

A Large Corporation Organized by China's Political Potentates.—The three high military commissioner, Gen. Chang Tso-ling, Gen. Tsao Kun and Gen. Wang Chuen-yuen are planing to organize an industrial corporation at a total capital of $10,000,000, at Tientsin, to take up the work of opening the mineral resources of Chili province.

Peking Starts New Sino-Japanese Bank—The Tatung Bank, a new Sino-Japanese banking enterprise, with a capital of five million yen, was opened recently at No. 58 Tamochang outside Chienman, Peking. The board of directors consists of the following:—

President: Mr. Lin Sui-shen.
Vice-President: Mr. Ho Hsi-ming.
Managing Director: Mr. K. Koide.
Manager: Mr. Lin Jeh-tsen.

Kyoshin Bank, Japan.—The Yokosuka Commercial Bank and the Kawasaki Kyoritsu Bank, have amalgamated under the name of the Kyoshin Bank, with head office in Yokosuka and 19 branches throughout Japan. Mr. K. Hashikawa has been made managing-director.

New Banks, Peking.—The flotation of the Sino, French Chen-yeh Industrial Bank has been completed and its formal inauguration will take place on the 25th instant at the Culty chambers in the legation quarters. In addition to this bank, another big bank called the Chung-nan Bank, or Central China Bank with a capital of ten million dollars, with its headquarters in Shanghai, has been officially registered in the ministry of finance and its chief promoters are wealthy Chinese emigrants from Singapore, Hongkong and other foreign colonies.—*Asiatic News Agency.*

Report of New Banks.—A new bank, capitalized at a total amount of $10,000,000 with $2,500,000 paid-up, was opened on May 28th, 1921 at Peking. This bank is named Tseng Nih, and its managers and sub-managers are Messrs. N. C. Woo and C. C. Hu.

A new bank, capitalized at $1,000,000, is being organized at Soochow, Kiangsu, by the local pawnshop keepers. Mr. Chen So-kiang, manager of Bank of Communications at Hangchow, will be manager of this bank.

New Bank, Shanghai.—A new bank capitalized at $2,000,000 was opened at Shanghai on May 31st, 1921. This bank is named Ming Hua, and its head office is at Peking.

Three more banks are being organized. One is named Chung Nan, capitalized at a total amount of $20,000,000, and to be paid up with $5,000,000 at the outset; one is named Sin Tung, capitalized at $500,000; and the third one is promoted by the local cotton merchants being under preliminary preparation.

A New Bank, Tientsin.—A branch of the Industrial Development Bank of China was opened on May 26th, 1921.

A New Bank, Amoy—An agricultural bank has been lately established at Amoy, Fukien. The total capital of the new bank is $100,000, and the general manager is the City Magistrate Mr. Lai Yu-ling.

Bank Amalgamation, Japan.—The Yasuda Bank has made a contract with the Kanagawa Bank, Aokicho, Kanagawa, for its purchase and amalgamation. The Kanagawa Bank will be converted into a branch office of the Yasuda Bank in a few days when the contract is formally announced.

Chung Hua Trust Company.—The first one of its kind in Shanghai, planned by Dr. P. Y. Wang, Chinese delegate to the international red cross conference last year, after his investigation tour in Europe and America, and promoted by many influential personages of Peking, Tientsin, Ningpo and Shanghai, capitalized at $10,000,000, the chiefs of the preparation committee for the organization of the company are Messrs. Yao Mo-lien and Koo Shing-yih, leading merchants of Shanghai.

GOVERNMENT FINANCE

Harbin-Heiho Railway.—The Manchurian authorities have promised the government that the Manchurian provinces will raise a fund to meet the expenses of the construction of the Harbin-Heiho railway so that there will be no necessity for a foreign loan.

A Loan for the China Eastern Railway.—The ministry of communications is negotiating with the Bank of China and the Bank of Communications for a loan of $2,000,000 to support the Chinese Eastern Railway. The loan will be guaranteed by the government with the revenue of the railway as security.

The New Loan in the F. M. S.—It is understood that about $7½ millions have been subscribed to the $20 million loan.

New Bond Issue Planned: China.—It is learned that Chang Chih-tan, minister of communications, is making preparation for the issuance of $10,000,000 worth of the Special Treasury Promisory Notes to meet the urgent need of the Government. He points out that $5,000,000 worth issued by Mr. Yeh Kung-cho were taken up by the Bankers in several days, there would be little difficulty in selling $10,000,000 if reliable sources of security is offered.—*Jih Pao.*

Loan to Develop Java.—The Dutch second chamber has adopted a bill authorizing the government to raise a loan of 250,000,000 florins at an interest rate of 7 per cent. for the development of the Dutch East Indies.

MINING

Chihli's Mining Resources.—So much opposition among Chinese and foreign investors has arisen since announcement of the formation of the Chihli Construction Syndicate that the government ordered the ministry of agriculture and commerce to cancel the grant of a charter given by the civil governor of Chihli. The new enterprise, which had the civil governor's backing, proposed to monopolize the mining resources of Chihli, which were only recently turned over by the government to the Chihli provincial government.

Stone Quarrying, Japan.—The Mogi Stone Co., Ltd. was organized recently with a capital of Y.250,000, quarter paid up, to quarry and sell stone. Their office is at 2 Kamakura-cho, Kanda-ku, Tokyo, and K. Okazawa is the manager.

Chuhsien Coal Mine.—A rich coal mine is reported to have been discovered in the neighborhood of Yi Shan, near Chuhsien in Shantung province. The coal has been tested and is said to be of a high quality. A company of merchants has been organized with a capitalization of $500,000 for its development.

Siberia Gold Mines.—The Ordoi gold mines, situated to the west of Blagovieschtchensk, have been leased for a lengthy period to American interests. Negotiations are in progress for the grant of further concessions in the Amur district.

Asa Coal Mining Company, Ltd.—Organized with a capital of Yen 500,000, fully paid up, to operate coal mines in Yamaguchi prefecture. Office: Asa-machi, Asa-gun, Yamaguchi prefecture. Managing Director: Y. Yoshino.

A Coal Deposit Discovered.—Coal has been found at Chiyanchow, Paipuchen, Chihli, and it is reported to be of very good quality. The Peking-Mukden Railway Administration has decided to operate the mine with a capital of $5,000,000, of which 60 per cent. is to be raised among the merchants. The Administration's ambition is to make the line independent in fuel supply so as to be free from the influence of contractors

Anglo-Chinese Coal Mining Syndicate.—An announcement is made of an agreement supposed to have been entered into with a British syndicate for the control of the coal rights of the province of Kwangtung, asserts the *Hongkong Daily Press*. In return for the payment of $1,000,000 in Hongkong currency, in two installments of $100,000 and $900,000, and the carrying out of certain conditions specified in the contract, the syndicate, to be known as the Kwang Tung Collieries (Ltd.), was to secure the coal mining monopoly in Kwangtung province for 90 years or more. The agreement provided that the company should be entitled to use any waterways, wharves, ports, railways and other means of transport or storage now existing in Kwangtung province, and also to construct, manage, and superintend and work any other roads, railways, waterways and buildings as may be deemed advisable to the business of the company, upon the payment of reasonable remuneration to any individuals affected by such use or construction. Hongkong is one of the principal ports of the world and coal experts have been investigating the possibilities of laying down cheap and suitable coal in Hongkong.

Langsuan Tin Mine, Siam.—Good progress has been made with the preliminary works in preparation for the installation of the hydraulic pipe-line, the survey of the pipe-line track being almost completed. The erection of buildings necessary to house the staff and native labor force is now in hand. A report, with recommendations regarding the pipe-line installation, is expected by the directors by the next inward mail, and this work will be proceeded with without delay.

Iron Mine, Kiangsi.—The richest iron ore fields in the province of Kiangsi are found in the Yungshin district, lying south of Pingsiang, where important collieries are situated. From every picul, the ore yields about 50 to 70 catties of iron. The smelters in the vicinity of these iron fields are said to be doing a good business by purchasing the ore direct from the takings and converting it into small handy slabs. The slabs are then transported down the river and sold to the iron foundries at Kianfu and Nanchang, the capital of Kiangsi, at $3.25 per picul.

Mine Bureau, Tsitsihar.—Wu Tsun-sheng, Tuchun of Heilungkiang, has asked the government to allow him to amalgamate the afforestation bureau and the gold mine prospecting bureau of Kirin with the industrial department of the province. The cabinet replied that the amalgamation will affect an afforestation loan with Japan and therefore cannot be granted.

Mongolian Mines.—Report have been received recently in certain government quarters in Peking to the effect that the Hutuktu has mortgaged the mining righs of Outer Mongolia to a Japanese syndicate against a loan of $10,000,000.

Smokeless Coal, Shantung.—A new coal field containing an immense quantity of smokeless coal, some of it equalling the best grades mined elsewhere in the world, has been discovered in Shantung, and is to be worked immediately by a company which employed Chinese and foreign engineers in the exploration. A Chinese business man is now organizing a company with $500,000 capital to develop the field.

Coal Mines in Yenchi.—Rich coal deposits have been discovered at a certain place adjoining to Yenchi, Hunchun and Chientao, comprising an area of over four hundred square *li*. According to the Chung Yang News Agency, the quantity of the coal contained in these deposits will be enough for the use of the inhabitants in whole Manchuria for a period of over one hundred years.

Tzehsien Coal Mines.—It has been resolved by the provincial authorities of Chihli that the Tzehsien Coal Mines, hitherto a governmental enterprise, should be converted into a limited company with a capital of $2,000,000. Preparations for subscriptions, etc. are being pushed on.

Chihli Assembly Mining Concessions.—The Peking cabinet has passed favorably on the request of the Chihli provincial assembly that the central government turn over to the assembly full control over all mines and mining concessions in Chihli that have not yet been taken up. The assembly's petition is now in the hands of the ministry of agriculture and commerce to undergo the formality of that department's sanction.

New Coal Fields, China.—Coal has been found at Chiyanchow, Paipuchen, Chihli, and it is reported to be of very good quality. The Peking-Mukden Railway Administration has decided to operate the mine with a capital of $5,000,000, of which 60 per cent. is to be raised among the merchants. The administration's ambition is to make the line independent in fuel supply so as to be free from the influence of contractors.—*Bureau of Economic Information.*

Iron in Ural Mountains.—The Ural iron mines have yielded 110,000 poods of pig iron and 15,000 poods of magnesium.

The total output of the Kailan Mining Administration's mines for the week ending 28th May, 1921, amounted to 94,855 tons and the sales during the same period, to 65,706 tons.

The Murata Shoten Company was organized recently with a capital of Y.200,000, quarter paid up, to mine and sell coal. Office: 2 Sanchome, Shintomi-cho, Kyobashi ku, Tokyo. Manager: Mr. S. Murata.

The Hokusen Coal Mining Company, Ltd. was organized recently with a capital of Y.1,500,000 fully paid up. Office: 1 Itchome, Yayesu-cho, Kajimachi-ku, Tokyo. Managing Director: I. Kasai.

MINTS

New Coins from Canton.—Work has begun at the Canton government mint in the coining of silver 10 and 20-cent pieces. It is reported that the daily output in silver coins amounts to $350,000.

To Recast Light Copper Coins at Shanghai.—The general chamber of commerce in Tientsin has voted to redeem the lightweight copper coins now in circulation in that city and to persuade the government to issue special paper currency for that purpose. If the plan is carried out the light coins will be recast into valid money. The coins that have been coming into China from sources unknown to the authorities are two-copper pieces. It is proposed to cast them over into single coppers. The poor are suffering because the coppers are refused by many merchants. While many must suffer somewhat in the process of redeeming the coins at their actual metal value, ultimately all will be benefitted, the merchants believe. The bad coins will not be accepted in trade pending the effort to have them redeemed by notes.

NEW ENGINEERING ENTERPRISES IN INDIA

India Joint Trading Co.—Directors: Hakian Abdul Hari Kham. Office: Jessore. Objects: Manufacturers of bricks, tiles, lime, cement, etc. Capital: Rs. 1,00,000.

Associated Transport.—Registered as a private Company. Offices: 58 Raja Dinendia St., Calcutta. Objects: Conveyance of passengers, goods and general transport. Capital: Rs. 20,000.

West Coast Union Chemical Works.—Mg. Director: V. K. Nair. Office: Cannanere, N. Malabar. Object: Manufacturing of chemicals. Capital: Rs 1,00,000.

Star Tile Works.—Mg. Propr.: S. Krishnan. Office: Malikaparamba, Calicut, Madras. Object: Tile factory. Capital, Rs. 2,00,000.

Sri Chandrasekara Industrials (Nellore).—Manager: Dr. M. C. Venkata Rao, Madras. Object: Candle and Soap Factory. Capital: Rs. 1,00,000.

Patna Swadeshi Industrial Co.—Managing Agents: Vaisya & Co., Patna City, Bihar. Objects: Starting new industries in India. Manufacturing, weaving, exporting and importing cloths, yarn, etc. Capital: Rs. 1,25,000.

Assam Transports.—Director: J. C. Maitra. Address: Tezpur, Assam. Objects: Business of motor lorries, taxi-cabs and general agencies. Capital: Rs. 50,000.

Swadeshi Cotton Mils & Co.—Address: Julu, Cawnpore, U.P. Objects: Cotton spinning. Capital Rs. 30,00,000.

Kalol Swadeshi Mills Co.—Managers: Shahi Maneklal Premchandbhai & Co. Address: Kalol (Kadi), Bawder. Objects: Spinning and loaming. Capital: Rs. 5,00,000.

Somnath & Mohanlal Patel's Ginning Factory.—Mgr.: Patel Somnath Jassangbhai Bavla. Address: Dholka, Ahmedabad, Bombay. Objects: Cotton ginning, etc. Capital: Rs. 75,000.

Varendra Rice Mills.—Address: Malopara, Rajdshani, Bengal. Object. Manufacturing and milling rice, grains, etc. Capital: 4,00,000.

Mangalagiri Sri Vuma Maheswara Gin and Rice Factory.—Address: Guntin, Madras. Capital: Rs. 25,000.

Tenali Sri Venkateswara Rice Factory.—Address: Tenali, Madras. Capital: Rs. 29,700.

GENERAL

Sino-Japanese Enterprises.—The Li Chung Company has been organized by the Chiaotung party with $5,000,000 supplied by Japanese financiers as a Sino-Japanese enterprise. The company will take up among other things, (1) the taking over of the Printing Bureau Loan furnished by the Mitsui Bussan Kaisha firm, (2) the starting of an afforestation company to be known as the Hai Lin Afforestation Company, (3) the taking over of the Wireless Telegraphy Loan from Mitsui Bussan Kaisha and (4) the supply of rolling stock to the Chinese Railways. The old Chiaotung clique has formed another corporation to work in co-operation with seven Japanese companies including the Mitsui Bussan Kaisha and the Okura Co. They will start a coal mining enterprise at Tatung with a capital of $3,000,000, of which $1,500,000 will be paid by Japanese capitalists for running expenses while the coal mine property will represent shares to the value of $1,500,000. It is expected that the mining laws will be modified to meet new conditions created by this coal mining enterprises. These enterprises are regarded as signs of the anxiety of the old Chiaotung clique to extend their influence in order to take the reins of government.

OIL

Exploitation of Oil Reserves of Chinese Turkestan.—It is stated in a recent issue of ***Oil News*** that the Chinese cabinet has sanctioned the exploitation of the oil reserves of Chinese Turkestan by a company registered under the title of the Chinese Turkestan Petroleum Co., the Chinese name of

which is "Funkungsze." The company is a British undertaking and its English experts have already begun drilling operations in two districts.

Production of Oil by British Company in Dutch East Indies.—It is learned that the annual production of crude oil of the Bataafsche Co. in the Dutch East Indies is 10,000 tons. This company is 90 per cent. British, and of the total quantity produced 2,000 tons go to Holland and the remainder is shipped to England.

Successful Oil Digging.—At Uroyama, Akita prefecture, the Nihon Petroleum Co. produced 150 *koku* of oil in 24 hours at a depth of 370 *ken* and at the Katsurade field 130 *koku* at a depth of 391 *ken.*

Oil Prospecting, Saghalien.—The work of prospecting the oil fields of Saghalien now in progress by the Nippon Petroleum, Hoden Oil Co., Okura and Kuhara companies is being retarded by the soft earth and other difficulties and orders have been placed for special equipment to cope with these conditions.

Oil-Fields in China.—According to statistical data compiled by Mr. Hsuing Hsi-ling, superintendent-general of oil-fields in China, there are altogether 89 regions in the republic producing petroleum: 22 in Chihli, 4 in Fengtien, 1 in Kirin, 13 in Kweichow, 17 in Yunnan, 8 in Kwangsi, 5 in Kiangsu, 4 in Shansi, 4 in Hunan, 5 in Kiangsi, 3 in Szechuan, 2 in Hupeh and 1 in Kwangtung. Of the above, Chihli, Kweichou, Yunnan, Kwangsi and Szechuan are said to produce an excellent quality of oil.

Yienchang Petroleum Factory, Shensi.—It is reported that one of the three wells of the Yienchang petroleum factory, Shensi, which has made an annual profit of about $70,000 since 1916, is not in good condition, and the head of the factory is going to Tientsin to invite an American engineer to make investigations.

Standard Oil Co.'s Pursuit of Dutch Oilfields.—According to the *Telegraaf*, two representatives of the Standard Oil Company have arrived at The Hague with a view to obtaining a concession for the exploitation of one-half of the Djambi Oil-fields. They express the hope that the Dutch first chamber will refer back to the second chamber the bill dealing with these oil-fields, and that it will be amended so as to give the Standard Oil Company equal opportunities with the Royal Dutch Company.

They point out that the proposed concessions, covering three and one-half million acres, are so extensive that the revenues of the Dutch state would be considerably increased if the oil-fields were exploited on a competitive basis by the Standard Oil and Royal Dutch Companies, instead of by the latter concern alone.—*Reuter.*

Four Large Oil Tanks Building: Hongkong.—Four large oil-tanks are being constructed at the Kowloon Naval Depot. It is expected that it will take several months to complete the work, which involves the laying of oil-pipes and other facilities for the conveyance of oil aboard naval vessels.

The American-Japanese Petroleum Co., Ltd. was organized recently with a capital of Y.500,000, quarter paid up, to do a general business in oils. Office: 4 Itchome, Kakigara-cho, Nihonbashi-ku, Tokyo. Manager: Mr. C. Ozaki.

PUBLIC WORKS

Hakone Roads, Japan.—A national park at the slope of Hakone mountain near the lake is being planned by Dr. Honda who has been entrusted with the work. It is also planned to build several fine roads round the lake.

Construction Engineers, Japan.—Mr. Y. Fukushima has established a business under the name of Fukushima & Company at 1 Yoshinaga-cho, Fukugawa-ku, Tokyo, to handle any kind of construction work.

ROADS

Road Construction in Fukien Province.—The military governor of Fukien province recently commenced the construction of modern roads between Yungchun and Chuanchun, Huyang and Tehua. The roads are being constructed of macadam with a width of 40 feet in the towns and of 25 feet in the country. The actual construction work is being done by Chinese engineers who have had experience in Singapore. It is planned to run a motor omnibus and freight service on the roads when completed.

A Road in Pootung.—An automobile route from Pootung to Chuensa is planned. The route is to start from Chung Ning Temple, Pootung, to the West Gate of Chuensa, comprising a distance of 38 miles. It is expected that the construction will cost Tls. 100,000.

New Road, Japan.—The road between Ons-mura and Umemoto, Iyo province, in all about 256 ken, is nearing completion and will cost in all Y.250,000.

New Roads, Japan.—Between Otchome and Rokuchome, a distance of 600 ken, a new road is being built. Pitch and concrete is used.

Road Construction, Japan.—The new road between Uwajiwa-machi and Yoshida-machi, Yehime prefecture, Shikoku has been completed. Its length is 570 ken.

Peking Streets to be Widened.—As a preliminary step towards the construction of a sytsem of tramways in the capital, the ministry of the interior deems it necessary to take measures to widen the different principal streets in the capital through which the tramways will traverse. The metropolitan police have received orders to widen every busy street in the city by ten feet on each side and to fill the gutters that line the streets on both sides.

Street Paving Planned for Tokyo.—It is reported that the work of reconstructing the streets of Tokyo will begin about the middle of this month. Plans for paving the streets have been under consideration for a long time but practically no actual construction has been done. Under the present plans the work will begin at Nihombashi, Uyeno and Kanda. Wooden blocks will be used in the paving and Y.2,000,000 will be spent in this first move toward improving the streets of Tokyo. At the same time the approaches to the Meiji Shrine at Yoyogi will be reconstructed. It is estimated that this work will take two months to complete.

Shanghai-Choling Automobile Road.—An automobile road, about 71 *li* long and 40 Chinese feet wide, from Shanghai to Choling via Minhang, neighboring towns of Shanghai, will be built. The survey of the whole line has been finished, and a limited stock company capitalized at $500,000 to run the enterprise has been organized. The construction work will be carried out under the supervision of the engineer, Mr. Y. F. Chow, a native graduated from Tongshan College. After the completion of the work, a regular service of carrying cargo and passengers will be run by 40 common cars capable of accommodating 20-24 persons and several special cars. The cost of the work, including the expense for re-building bridges, purchasing cars and lands, is estimated at about $220,000, and the inauguration of the enterprise will cost about $100,000.

Automobile Service Started in Nantungchow.—Regular passenger automobile service has been commenced at Tong-shih, commercial centre of Nantungchow.

Rubber as Paving.—Singapore is to experiment with rubber pavements, and in view of the effect such a use of rubber may have on a depressed industry the venture will be watched with considerable interest. Rubber paving is not altogether new, but it is certainly an innovation in the East.

Tokyo Street Improvement.—The construction of the street from Hihonbashi to Manseibashi is to begin soon. The cost, estimated at Yen 2,000,000, is to be defrayed by an Imperial grant of Yen 1,500,000 and the balance from the national treasury. The wood block program has been discarded for asphalt.

Tokyo Yokohama Road.—It has been decided to widen the width of the new asphalt highway between Tokyo and Yokohama to 12 *ken*. The removal of houses is progressing and actual construction will commence soon.

Road-Building Schemes.—The Shensi Famine Relief Society is extending its roadmaking operations, continuing the road from Taiyuanfu to Chinssu on to Fenchowfu, thus connecting with the road, built by the American Red Cross, from Fenchowfu to the Yellow River. This will complete a good road from the Yellow River at Hochu to the capital, a distance of over 100 miles. It is planned to macadamize the stretch from Taiyuanfu to Chinssu in the hope that eventually the whole of the provincial motor-roads will be macadamized. Unless that is done, heavy motor traffic will be impossible. Famine labor is to be used for all these projects.

Long Distance Automobile Road in Northern Kiangsu.—An automobile road will be built from Quochow, a small island in the Yangtze River near Yangchow, to Tsinkiangpu, a city in northern Kiangsu on the west bank of the Grand Canal, a distance of about 340 *li*. Ferry steamer service will also be provided on this line in the Yangtze River.

Road Building in Northern Kiangsu.—Mr. Chang Chien of Nantungchow has undertaken to build an automobile road between Nantungchow and Tsingkiangpu, a distance of about 400 *li*, connecting with Chinkiang, Hsuchow, Haichow and Pukow to Tsingkiangpu by automobile roads running from 250 *li*, to 300 *li* long which are being planned by the local influential merchants—Messrs. S. L. Lu, P. Y. Wang and T. S. Chu. A commencement of the program the Yangchow-Chinkiang automobile road, about 50 *li* long, will be first built at an estimated cost of $150,000. The survey of the whole line has been finished and two-thirds of the amount of capital has been subscribed.

Hangchow-Yuchang Automobile Road.—It is being planned to build an automobile road between Hangchow and Yu-hang, a city about 90 *li* away to the west of Hangchow, by Mr. Koo Tze-tsai and Mr. Wang Ting-shan, natives of Hangchow and Yu-hang. The whole line is being surveyed.

Good Roads Movement: Philippines.—Mr. Forbes, who began the campaign for good roads in the Philippines fifteen years ago, when he was secretary of commerce there, has devoted much time on his trip to an inspection of their present condition. There was much feverish activity on the roads just before the arrival of the mission in Manila, some of them having been completely re-surfaced. Mr. Forbes, however, has made numerous side-trips by motor, and has examined the highways which are off the main line from Manila to Baguio. The results of his investigation have not yet been made public.—*Reuter.*

Propose New Road.—Japanese interests have approached the government with regard to the construction of a railway line from Tienpaoshan to the Tumen River. The matter is now under the consideration of the ministry of communications.

Road Construction.—The ministry of the interior is reported to be working on a plan for a road from Peking to Shanghai. They also report of the organization of a company capitalized at $1,000,000, gold, to construct a road 130 miles long from Amoy to Foochow, for motor-car traffic. A road from Shanghai to Woosung and to Hangchow, 260 miles in all, is also planned. As part of the famine relief measures, a road is being constructed between Tsinan and Lokow, the Yellow River port.

Motor Road in Canton.—A motor road to the famous Loh Fo Hills is projected by a supervisor of the maritime customs administration at Canton, says the *Hongkong Daily Press*. His suggestion is that it should start from Wang Ka Shan, immediately opposite the city of Sheklung. The local authorities are said to favor the project. It is estimated that the road will cost $150,000 to construct.

The Tokaido road construction plan was put into effect recently with the commencement of the Namamugi to Rakugo road, a distance of four miles. The plan involves Y.2,800,000.

RIVER, HARBORS, WHARVES AND DOCKS

Manila Port Improvements.—The proposed port improvements of Manila, calling for an expenditure of more than 100,000 pesos will soon come up for serious consideration by the United States government, according to information recently given out by the governor-general's office.

It is stated that a commission, composed of representatives of the American war, navy, commerce and state departments, the United States shipping board, and a delegate from the Philippine government, will be assembled in Washington to settle the question of making Manila the American trade base in the Far East through the construction of additional docks and breakwaters.

Conservancy Works in Anhuei.—The dredging of the Chu-hu River, which flows for about 80 miles through northern Anhuei, has been finished at an aggregated cost of more than $6,000,000, under the supervision of the Pengpu conservancy works. Similar work is to be undertaken on the Wei River, the main waterway of Anhuei, by the same board.

Tai Hu Lake Conservancy.—For the conservancy works of the Tai Hu lake a sum of $300,000 has been allocated to Kiangsu and $200,000 to Chekiang by the Peking government. The work is being carried on by the Tai-hu Lake conservancy board under the directorship of Mr. Wang Tsing-mo. As recommended by Mr. Heidenstam, engineer-in-chief of the Whangpoo conservancy board, a small dredging machine at a cost of about $240,000 will be purchased.

Singapore River Improvements.—Messrs. Coode Matthews, Fitzmaurice and Wilson, have reported to the Straits government, on "Singapore River Improvements." This was reported on by the same firm in 1901 and in 1906, and the chamber of commerce again brought up the subject in 1919. Hence this further report. As engineers, the firm had to supply a scheme, if it were decided to "improve" the river, and they submit a $15,000,000 plan for building concrete walls on either side, with the raising of the bridges and the strengthening of the abutments. But they are not enthusiastic about it, indeed they damn it with faint praise.

The *Free Press*, commenting on the report, says :—"The Government certainly has no money to spend on a large work of any kind at present, but it would certainly be a mistake to listen to the demands of those who (as a secondary consideration, perhaps) have an eye to the increase in the value of their river shore property, and to support a scheme which, as we read it, stands condemned in the eyes of the firm who make the report referred to."

Rival to Tsingtao.—The latest report concerning the port of Haichow, Shantung, which may be regarded as something of a rival port to Tsingtao, is that reconstruction of the harbor has been decided on by the Peking government, and that a director of the Haichow harbor works office has been appointed in connection with the scheme.

Hulutao, a Commercial Seaport.—The cost of constructing the harbor and other important works for the development of Hulutao, Chihli, as a commercial seaport is estimated at over $3,000,000.

Conservancy Works in Northern Kiangsu.—The Chuen-yang river is an important waterway in northern Kiangsu, but as it has not been repaired for many years it is in a congested condition. Mr. Chang Chien, director of the conservancy bureau of the Grand Canal, has obtained the consent of the central government to dredge the Chuen-yang river. A new waterway will be dug, lengthening the old river from Cho-shia to Kwuan-yung, the northern coast city of Kiangsu, a distance of about 471 *li*. The work is estimated to cost $3,000,000 in all.

Port Improvements at Tsingtao.—Vice-Consul Norwood F. Allman reports from Tsingtao, China, that, according to a statement of the director of the wharves in Tsingtao, the Japanese government has authorized the expenditure of Y.1,000,000 toward the improvement of the Tsingtao wharves, at present greatly overtaxed. This sum will be expended over a period of three years.

Manila Port Improvements.—The proposed port improvements of Manila, calling for an expenditure of more than $100,000 will come up for serious consideration by the United States government, according to information recently given out by the governor-general's office there.

It is stated that a commission composed of representatives of the American war, navy, commerce and state departments, the United States shipping board, and a delegate from the Philippine government, will be assembled in Washington to settle the question of making Manila the American trade base in the Far East, through the construction of additional docks and breakwaters.

Ramon Fernandez, mayor of Manila, is considered the probable representative of the Philippine government.—*Reuter*.

Bombay Reclamation Project.—In regard to the back bay reclamation scheme of Bombay, the Indian and eastern engineer states that the area to be reclaimed is 1,145 acres, which will be enclosed by a wall 4 miles long, built of stone and concrete. A notable feature of the project is the method by which the actual reclamation will be effected. The total amount of filling required is 27,000,000 cubic yards, or a space 5 miles long, 1,000 yards broad, and 9 feet high. Material will be obtained by dredging the harbor on the east side of Colaba Peninsula and pumping the material through pipe lines across the peninsula into the bay. The quantity of clay filling required is 25,000,000 cubic yards, the remainder, 2,000,000 cubic yards, to consist of topping and hard moorum. It is estimated that the reclamation of 4,000,000 square yards will require an expenditure of £4,000,000, or an approximate cost of £1 per square yard. It is expected that the work will require seven years.

The Harbors of Yokohama, Shimonoseki, Naha and Shimizu will be reconstructed at costs as follows :

Yokohama Y.8,237,000, work to be done between 1921 and 1930.

Shimonoseki, Y.3,610,000, work to be completed by 1927.

Nara, Y.1,500,000, work to be finished by 1925.

Shimizu, Y.5,500,000. This harbor will be dredged to anchor 20,000-ton steamers.

Tachingho Harbor Construction.—With reference to the proposed organization of the Chihli Construction Corporation and the strong opposition of another section of the Chihli people to same, the secretariat of the cabinet has officially written to the ministries of foreign affairs, of the interior, of agriculture and commerce and of communications stating that in order to avoid enquiries or protests from Japan and Britain and possibly other powers, the greatest attention should be paid to the petition of Chihli authorities for the sanction of the scheme relating to the construction of a new port and harbor in the vicinity of the Tachingho river with policing rights because it will be the rival of Tientsin. The question cannot be decided in the near future because the supporting and opposing petitioners are leaders of equally powerful factions in Chihli, while the latter is also supported by Chihli residents in Shanghai and other provinces. The opponents charge the Chinese promoters of the corporation as second Anfu men who used to bargain away the birthrights of the Chinese people to foreigners chiefly for their own private interests when they were in power.

RAILWAYS

A Railway Loan.—The ministry of communications has negotiated with a British syndicate for a loan for construction of a double-track railway line between Tangshan and Shanhaikuan. The locomotives and equipment of the Peking-Mukden line are being offered as security. The loan agreement has been signed.

The Kirin-Huaining Railway.—Mr. Ono, the vice-president of the Industrial Bank of Japan, who came to Peking to attend the annual meeting of shareholders of the Exchange Bank of China, of which the Industrial Bank of Japan are the principal shareholders, has been negotiating with the ministry of communications over the final stages of the loan for the construction of the Kirin-Huaining Railway. The preliminary agreement was entered into by Mr. Tsao Yu-lin with Japanese interests during Tuan Chi-jui's premiership. It is semi-officially stated that the final agreement has been signed. The railway will run from Kirin through Yenchi and across the Tumen River into Korea.

It is understood that Mr. Ono will also approach the Chinese government regarding the repayment of Japanese loans contracted by the Anfuite administration. It is stated that neither principal nor interest on these loans has been met.

The ministry of communications has sent experts to survey the Tsangchow-Shihchiachuang railway with a view to the establishment of a telegraph line.

Kin-Sui Railway Extension.—For the construction of the Suiyuan-Paotou section of the Peking-Suiyuan railway, an agreement has been signed by the railway administration with the Japanese Asiatic Industrial Development Company for a loan of three million dollars. The security for the loan is four million dollars treasury bonds. It is a short-term loan whose proceeds will be solely used for constructional purposes. It has nothing to do with the new consortium because the loan is a local and short-term agreement.

New Railway Companies, Japan.—The Japanese railway department has received applications up to the end of February, 1921, from 98 companies for franchise totalling 1,961 miles of new lines.

Many of these will be rejected, but others, whose names follow, will receive permission :—

	miles
HOKKAIDO.	
Hidaka Colonial Tramway Company	91.75
Uraho Mining Tramway	11.36
NORTHEAST JAPAN.	
Kashiwazaki Tramway Company	23.10
Kariwa Tramway Company	22.00
Senyama Tramway Company	13.00
CENTRAL JAPAN.	
Nippon Electric Tramway Company	296.30
Konan Electric Tramway Company	47.20
Nagoya Electric Tramway Company	39.63
Tenryu Electric Tramway Company	26.09
Tenryu Hydro Electric Tramway Company	33.25
Chita Electric Tramway Company	32.42
Sakawa Electric Tramway Company	39.00
WESTERN JAPAN.	
Ungei Tramway Company	55.40
Chunan Tramway Company	53.70
Geinan Tramway Company	47.28
Imari Tramway Company	12.00
Awa Electric Industry Tramway Company	46.11

Peking-Suiyuan Railway Fengcheng Branch.—The Peking-Suiyuan railway has now announced

that the extension from Fengcheng to Suiyuan is entirely open to both passenger and freight traffic.

Work Recommenced.—The construction of the Chuchow-Chuping section of the Canton-Hankow Railway was begun on May 1, as the result of the decision of the government in January last to set aside a portion of the revenues of the Peking-Hankow and other railways for that purpose.

Kirin-Huaining Railway.—The Japanese legation states that the final contract for the Kirin-Huaining Railway Loan has not yet been signed.

Elevated Railway, Tokyo.—The Tokyo *Maiyu* says that the plans for the construction of the elevated railway between Uyeno and Manseibashi station are progressing and that the line will be completed in 1923. It will connect the north entrance of the city with Tokyo Station. An area of ground, comprising about 13,000 *tsubo*, has been purchased along the proposed line, and the tenants, numbering 550 families, have been instructed to vacate by September. The construction work is to cost Y.4,500,000, it is said.

The Peking-Suiyuan Extension.—The completion of the Peking-Suiyuan Railway, a line about four hundred and sixteen miles in length, has been announced by the Peking-Suiyuan Railway Administration. The railway authorities have decided that through traffic between Peking and Suiyuan will be formally opened on May first. Construction work of the extension from Suiyuan to Paotouchen will be commenced before long, as a surveying party under an engineer, Mr. Chow, has already been sent out.

Peking-Suiyuan Loan.—It is reported from Peking that an agreement has been signed with the Japanese Asiatic Development Company for a loan of $3,000,000 in connection with the construction of the Peking-Suiyuan Railway. The loan is said to have nothing to do with the new consortium, being only a local and short tern agreement.

New Railways in the D.E.I.—There is undoubtedly going to be a great expansion throughout these islands in new railroad systems, involving many millions of guilders.

According to all accounts there ought to be plenty of orders to go round without any undue monopolizing, and we have little doubt but that, Dutch, British, American, German, and one or two others will be engaged in this stupendous task which will occupy a year at least.

U. S. A. or German Locomotives.—In connection with the order obtained by a German firm for rolling stock for Java, it is stated in the New York Press that an American manufacturer's bids of $63,000 and $60,500 for two types of locomotives compared with German tenders of $25,000 and $22,000 respectively.

Canton-Hankow Railway New Cars.—The Wuchang-Changsha section of the Canton-Hankow Railway has received a new shipment of 45 cars from England which will relieve the present congestion of goods traffic. For the Chu-Keng section of this railway between Hunan and Hupeh, the Chiaotungpa has called upon the Peking Mukden Railway, the Peking-Suiyuan Railway, the Peking-Hankow Railway and the Tientsin-Pukow Railway each to contribute a monthly sum of $400,000 for defraying the cost of the new engineering work undertaken for the section in question. Engineer-in-Chief Cox has recommended the engagement of two additional British engineers to look after the construction of bridges and sub-way in the Southern section of Canton-Hankow Railway.

Southern Section Canton-Hankow Railway.—Again it is announced that work upon the southern section of the Canton-Hankow Railway will be continued, and that a sum of $120,000 for this purpose will be provided by the Peking-Hankow, Tientsin-Pukow and Peking-Fengtien railways to commence with, while it is further hoped to raise an annual amount of about $5,750,000 until the line is completed.

Double Track to Tiehling.—The South Manchuria Railway has been building a double track line to Tiehling. This line is about to be completed soon.

New Railway Started.—Construction work on the branch line of the Peking-Mukden railway from Chinchow to Chowyang is now in full swing. Work was commenced in April, and the section between Chinchow and Yichow will probably be completed by the end of the year. The Yichow-Chowyang section will be commenced at the beginning of next year.

Loan for P. M. Railway.—For the building of the Dahushan-Heishan branch of Peking-Mukden railway, an amount of $300,000 was borrowed from Ming Yih Coal Mining Company.

The Chefoo-Weihsien Railway.—The technical department of the Chefoo-Weihsien railway bureau reports that road-bed has been completed, and asks for instructions regarding the laying of the rails. The department points out that the railway is urgently needed to develop economic and industrial interests in the region.—*Reuter.*

New Chinese Railway Company.—Three principal points of interest in regard to the construction of a railway from Canton to Hoiping, Kwangtung province, by a Chinese syndicate, are that the railway is primarily a commercial enterprise, that it will have a total mileage of 210 *li*, or 70 English miles, and that it will traverse some of the richest silk and tobacco producing regions of the province.

Kirin-Tehui Railway.—The construction work of railway between Kirin and Tehui was to have been put in hand early this month, but has been obliged to be put off owing to the shortage of construction materials.

Ssupingkai-Taonan Line.—Work on the construction of the 70-mile extension from Chengchiatun to Paiyintala on the Ssupingkai-Taonan Line of the Chinese Government Railways was started on the return of spring, and has progressed with almost incredible despatch. The whole work promises to be finished before the advent of winter next November. The remarkable quickness of the work is owing to the level stretch of the country, through which the extension runs.

The Nagoya Electric Railway Company has been granted permission by the minister of railways to lay a new line between Inuyama, Aichi prefecture, and Seki Gifu prefecture, 10.35 miles in length.

British and Chinese Corpn. Loan.—The cabinet recently passed a loan agreement with the British and Chinese Corporation, Ltd., for turning into a double track the distance between Tangshan and Shanhaikuan on the Peking-Mukden Railway.

Chuchow-Chuping Rail Work Started.—The construction of the Chuchow-Chuping section of the Canton-Hankow railway was begun on May 1, as the result of the decision of the government in January last to set aside a portion of the revenues of the Peking-Hankow and other railways for that purpose. The delay was caused by these revenues being used for other and more pressing purposes.

A Chinese Railway Deal.—The following is the outline of the agreement recently concluded between the communications department and the British and Chinese Corporation, Ltd., in connection with the establishment of a double track between Shanhaikuan and Tangshan on the Peking-Mukden Line :—

1.—The contracted loan to be £500,000 sterling.
2.—The sum of $166,660 to be delivered monthly to the Peking-Mukden Railway bureau by the Hongkong and Shanghai Banking Corporation, beginning on May 17 of the present year.
3.—Interest to be 8 per cent.
4.—The commission to be 1.5 per cent.
5.—The profit of the Peking-Mukden Railway to be appropriated as security.
6.—Repayment of the principal and interest to start from June of next year.

Heiho-Harbin Railway to be Built.—The scheme for the construction of the railway line from Heiho to Harbin which has been under consideration for some time, is now decided upon by the Heilungkiang provincial assembly who will raise the necessary capital, amounting to $6,000,000 by subscription in the form of debentures. The work of construction is to be begun in the Spring.—*Chen Pao.*

A New Railway Line.—Japanese interests have approached the government with regard to the construction of a railway line from Tienpaoshan to the Tumen River. The matters is now under the consideration of the ministry of communications.—*Reuter.*

Railroad Construction: Saghalien.—As early as the autumn of last year the Japanese started making a railroad from Alexandrovsk to Onora to establish communication with Japanese Saghalien. The work is being done by Japanese workmen specially brought from Japan, and the Russians are only employed to attend to horse haulage. In the winter the Russians got remunerative employment in carting stores from Alexandrovsk to Onor, Rikovsk, Timovo, etc.

New Elevated to Cost Y.4,500,000: Japan.—The plans are now complete, says the Tokyo *Maiyu*, for the construction of the elevated railway between Uyeno and Manseibashi Station, to connect the north entrance of the capital with the Central Tokyo Station.

For this purpose a tract of land along the proposed railway line covering an area of 13,000 *tsubo* has already been purchased and the tenants numbering 550 will evacuate their houses within the district by September.

The construction work, it is estimated, will cost Y.4,500,000 and will be completed the year after next.

Proposed New Road.—The director of the Shanghai-Nanking Railway has suggested construction of a double line between Pennin and Tanyang. Construction to commence in June next.

New Railway, Saghalien.—A new railway line between Sakaihama and Shikika, a distance of 150 miles, will be built by a newly organized company at Karafuto, Saghalien, for which purpose Y.10,000,000 will be subscribed, half by the promoters and the other half by the public.

SHIPPING

Sino-Belgian Navigation Plans.—The proposal for the starting of a steamship navigation service between China and Belgium has been under consideration for some time, and it is now learned that the waichiaopu and the Belgian legation have lately been in close consultation on this problem. Definite plans and regulations for the new service have been drawn up. The service will maintain two separate navigation routes, six, from Shanghai and Hongkong to Belgium via Singapore, Bombay and Mediterranean Sea, and from Shanghai eastward to Japan, Panama Canal, New York and Liverpool to Belgium. The charter will be registered shortly, and capital for the enterprise has been raised. — *Minkuo News Agency.*

Chinese Ocean-Going Vessels.—A Chung Hua Navigation Co., Ltd. has been lately organized at the capital of Chile by the Chinese residents at South America with a total capital of $4,000,000. The new company will operate steamers on the Hongkong-Chile run via Shanghai, Honolulu, Mexican, Panama and Peru, and the Hongkong-New York run via Shanghai, Honolulu,

Panama, and Cuba with Chinese-owned vessels and under the Chinese flag.

Steamers Wanted.—Wusih exports large quantities of silk annually. Owing to the lack of transportation several merchants and factories have combined to purchase a few steamships to sail from Shanghai to Wusih for the sole purpose of transporting silk.

Electrically Driven Steamer, Japan.—The first electrically driven steamer the *Biyo Maru* of 5,450 tons launched some time ago at the Asano Dock Yard, at Tsurumi was given her trial trip on May 4 with excellent results. It is expected that other similar steamers will be constructed.

A New Steamer for the Ichang and Chungking Railway.—On June 1st, 1921 a new shallow-draft steamer was launched in the Whangpoo river, built by the Ho Shing Shipbuilding Yard, Shanghai, for the Chinkiang Steam Navigation Company, Szechuan. The hull of the steamer is 135-ft. long and 22-ft. broad, drawing 5-ft. of water, weighing 240 tons in all, having a speed of 13½ knots per hour, equipped with two engines of 1,400 H.P.

Seven More Ships Ordered by America.—It is reported that a certain shipping company in America has awarded another contract to the Kiangnan Dock and Engineering Works in Shanghai for the building of seven more freight steamers.

Dutch E. Indian Fleet.—Efforts are being made in Holland to raise a fund of £20,000,000 for the construction of an East Indian fleet.

The Asano Dockyard Co., Ltd. will construct a new depot ship for hydro-planes to the order of the Navy Dept. She will be about 9,500 tons.

Steamship for Imperial Petroleum Co.—The steamer *Tachibana Maru* was launched from the Harima Shipbuilding Works recently. Her displacement is 8,800 tons.

TRAMWAYS

Besei Tramway Company will build new tram lines between Ichinomiya Machi and Jiumoku-mura, Aichi prefecture, for which purpose the capital of the company has been increased to Y.2,500,000.

New Electric Cars, Japan.—The electric bureau of Tokyo has decided to run a new type of car tween Shinagawa and Osakusa, Uyeno, and have instructed the Hamatsucho Factory to draw up plans.

Javan Tramways.—Negotiations are proceeding for the creation of a combine of the Java Tramways with a capital of 90,000,000 gold florins, and if possible with the co-operation of British capital.—*Reuter.*

A Chapei Tramway.—The Nantao Tramway Company has decided upon extending its service to the Chapei district. Contracts are said to have been placed, and the actual work of construction will shortly be begun.

TELEPHONES AND TELEGRAPHS

A New Telephone Between Shanghai and Woosung.—The ministry of communication has sanctioned the application of the Whangpoo conservancy board in stal a long distance telephone between its Shanghai office and the Woosung works. The conservancy will bear the expense of the installation of $2,795 and pay an annual fee of $600 to the Chinese Telephone Company in addition to its arrangements with the Shanghai Mutual Telephone Company.

Chochow-Paoting Telegraph Line.—A telegraph military line will be set between Paoting and Chochow, Chili, a distance of about 180 *li*, as requested by the military governor of Chili, Gen. Tsao Kun, and sanctioned by the ministry of communications.

Shanghai-Nanking-Wuhu Long Distance Telephone.—The construction of a Shanghai-Nanking-Wuhu long distance telephone line has been proceeding since the scheme was ratified by the ministry of communications. Buildings for the centrals at Shanghai and Nanking have been erected—the former at a cost of $130,000. Poles are being set between Shanghai and Nanking along the railway. The line is expected to be completed in June of this year.

New Telegraph Offices, China.—Telegraph offices have been established at Liu-chen-hsien, Kwangsi, and Kwan-hsien, Shantung, and opened for service.

New Wireless Proposed.—One of the question to be brought before the conference of the presidents of the meteorological observatories in Japan, which is in session now, is a proposal to install a wireless telegraph at the marine meteorological observatory in Kobe which will enable the navigators to reserve the wireless communications on the meteorological conditions, says the *Nichi Nichi*. On the completion of the installment the observatory will report three times a day the changes of meteorological phenomena to ships and vessels on the sea.

U. S. Installs Big Wireless at Peking.—A powerful wireless station is now under construction in the compound of the American legation there. The cost is 150,000 *yuan*. Its height will be three hundred feet and after completion, direct communication will be commenced between Peking and Washington. The present wireless tower at the American legation is only 175 feet high and communication is limited to the Philippines.

Wireless on Ships.—The *Hongkong Telegraph* states that the Hongkong government is considering the matter of the compulsory equipment with wireless apparatus of vessels registered at, or frequenting, Hongkong. It is probable that a bill will shortly be introduced in the legislative council.

Telegraph Service of Siam.—According to the official report of the post and telegraph department of the government of Siam for the fiscal year ending March, 1919, the telegraph service comprised 7,500,000 kilometers of telegraph lines, involving 10,500,000 miles of wire. There were 230 offices, 83 of which were under the management of the post and telegraph department and the balance under the control of the Royal State Railway. The revenues for that fiscal year amounted to 993,543 ticals and the expenditures to 782,873 ticals, showing a net profit of 215,670 ticals.

Telephone Experiments.—Two examination halls will be erected by the communication department, one in Fukuoka city and the other at Fukushima city at a cost of Y.160,000 where investigations regarding telephones and telegraphs will be conducted.

WIRELESS

New Wireless Plant, Kobe.—A wireless station is being erected at the Kobe Post Office for communication with steamships and is expected to be in service by July. The supporters of the scheme are the Mitsubishi Dockyard, Kawasaki Dock, Yamashita, Osaka, Nippon Yusen and seventeen other marine companies. If this plant gives good results a similar one will be installed at Yokohama.

The Peking government plans to establish wireless stations in Chefoo and Weihsien.

New Tokyo-Kobe Service.—The department of communications is rapidly extending its new construction program and recently decided to add two more wires between Tokyo and Kobe via Osaka.

Wireless Stations Open for Commercial Traffic.—Commercial interests will be interested in the following announcement from Manila :—

The naval radio station at Cavite has advised the bureau of posts that beginning May 1, the radio circuit between Saigon (Indo-China) and Cavite will be opened for handling commercial traffic between Indo-China and points in the United States, Hawaii and the Philippines.

The rate from radio Cavite to Saigon will be 44 centavos a word and to other points in Indo-China 54 centavos.

Gap Rock, Hongkong, to have a Wireless Equipment.—In view of the urgent need for a resumption of telegraphic communication between Hongkong and Gap Rock, it will be learned with interest that work is now well in hand for the equipment of Gap Rock with a wireless plant, which, when completed, will fulfill the service formerly supplied by the cable.

WATERWORKS

New Machinery for the Chinese Waterworks, Shanghai.—The new machinery for the Chinese Waterworks, Shanghai, ordered from U.S.A., is expected to arrive in June. The installation will take about two months.

Wuchang Waterworks.—New waterworks are to be established in Wuchang, Hupeh. The total capital is $1,500,000, of which $400,000 has been collected. Construction will commence shortly.

New Water Reservoir for Dairen.—The construction of a new reservoir at Lungwangtang for the Dairen Waterworks on a five years' program at the total cost of Y.4,600,000 is being hurried forward. It is planned to be 45-ft. deep, and the excavation work has progressed to the depth of 35-ft. It is situated at about five miles from Lungtou Station this side Ryojun Station on the Port Arthur Branch Line. Lately a light rail line has been laid between the new reservoir and the seashore at Wangchiatun, and all materials from Dairen are loaded in cargo boats or junks at Hama-cho Pier, Dairen.

Waterworks, Ipoh, F.M.S.!—During the year contracts were let for preparing two separate schemes for an increased water supply to Ipoh. Reports on these schemes have been received by the government and are under consideration. The present supply amounts to 36 gallons per head of population per diem. Proposals are now under consideration for improving the existing supply and making it accessible wherever it is at present deficient.

Manila Metropolitan Water District!—The metropolitan water district was created by Act No. 2832 of the Philippine Legislature, for the purpose of furnishing an adequate water supply and sewerage service to the inhabitants of the city of Manila and the neighboring municipalities comprising all territory within the boundaries of the city of Manila and the near-by municipalities of Montalban, San Mateo, Marikina, Pasig, Pateros, San Pedro Makati, San Juan del Monte, San Felipe Neri, Caloocan, Malabon, Navotas, Pasay, and Paranaque. The secretary of the interior is to have general control and supervision over the corporation.

The corporate powers shall be exercised by a board composed of the mayor, who shall be the president of the board ; the president of the municipal board of the city of Manila ; the governor of the province of Rizal ; the director of public works ; and three taxpayers of the district, to be appointed by the governor-general with the consent of the senate.

Pursuant to the law the district board is constituted by the following : Hon. Justo Lukban, city mayor, president ; Hon. Ramon R. Papa, president, municipal board ; Hon. Andreas Gabriel, provincial governor of Rizal ; Mr. Jose Paez, director of public works ; Mr. Horace B. Pond ; Mr. Felipe Buencamino, jr. ; Mr. Vincente P. Genato ; and Mr. Jose F. Ramos, secretary-treasurer.

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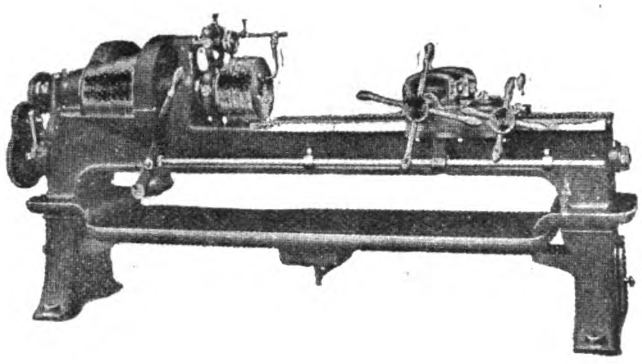

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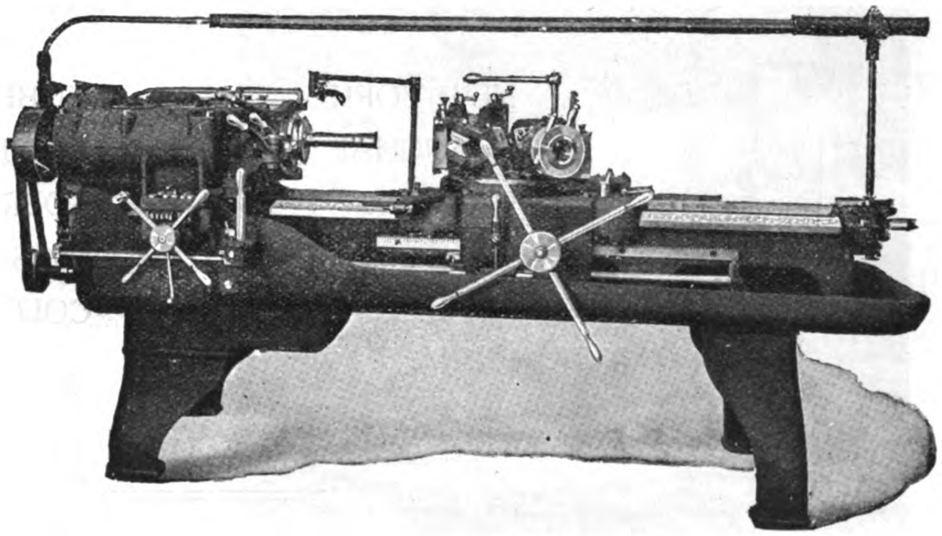

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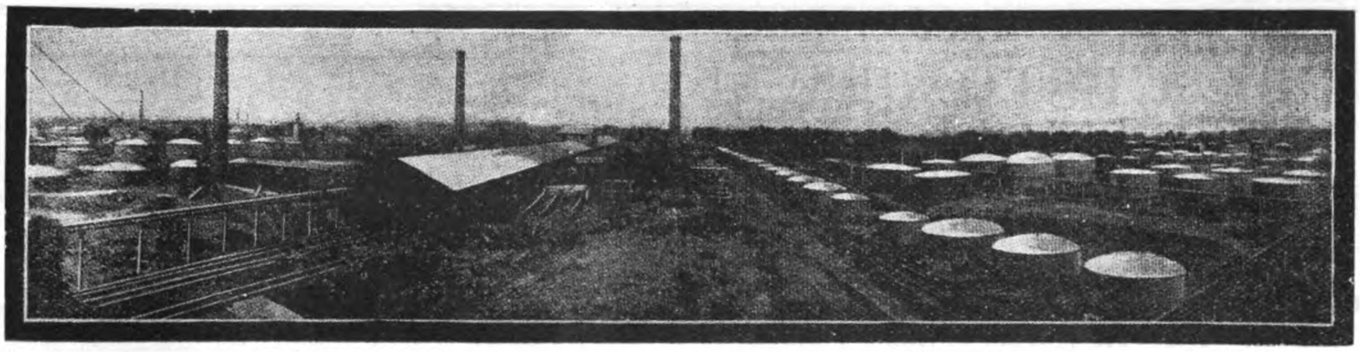

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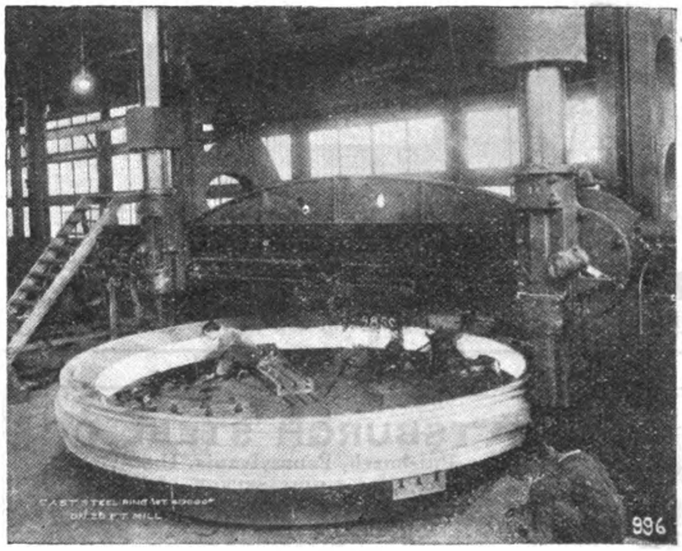

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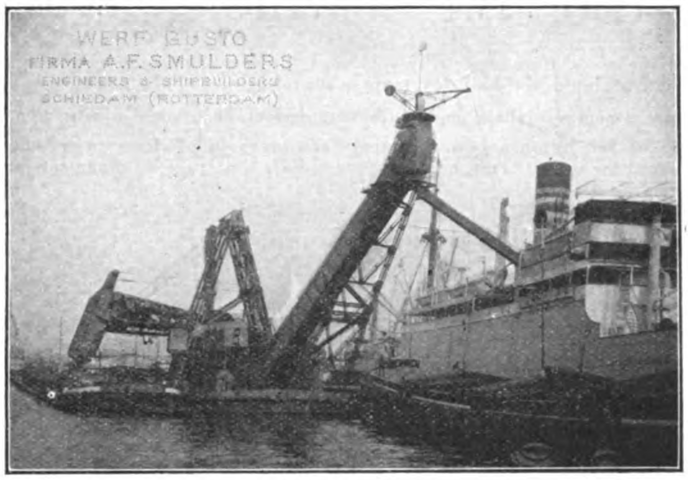

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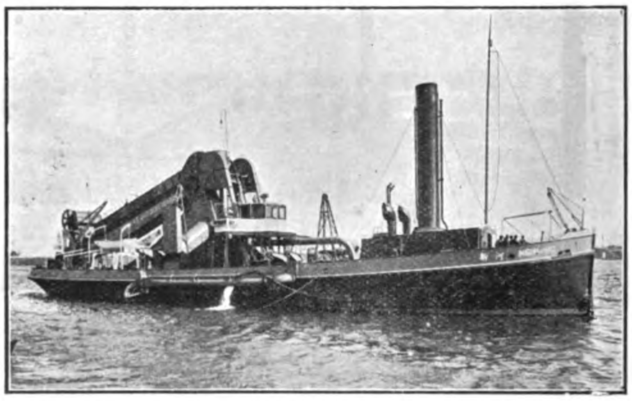

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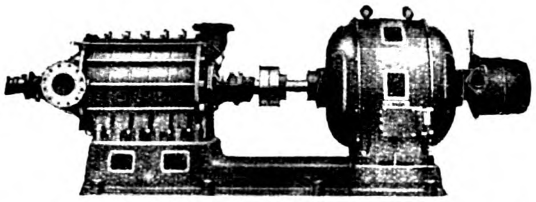

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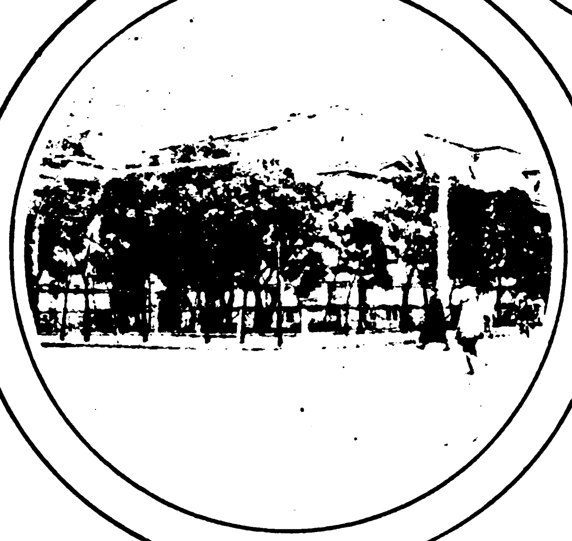

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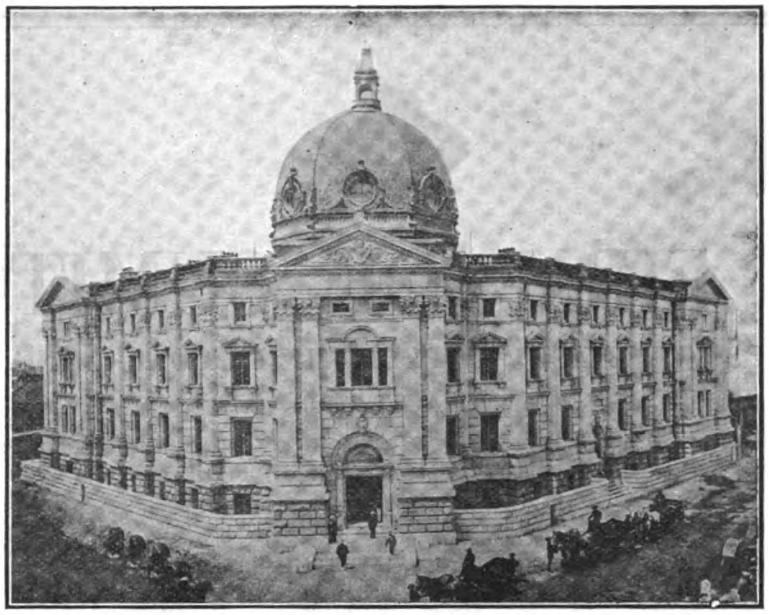

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CORRESPONDENTS AT ALL THE CHIEF COMMERCIAL CITIES IN THE WORLD

The Yokohama Specie Bank, Ltd.

Established 1880

DIRECTORS:

President: NAKAJI KAJIWARA, Esq.
Vice-President: SHIMAKICHI K. SUZUKI, Esq.
NAGATANE SOMA, Esq.
YUKI YAMAKAWA, Esq.
MASNOSKE ODAGIRI, Esq.
BARON KOYATA IWASAKI
KONOJO TATSUMI, Esq.
FUKUSABURO WATANABE, Esq.
IWAO MATSUKATA, Esq.
MORINOSUKE MITSUI, Esq.
BARON KAISAKU MORIMURA
REITARO ICHINOMIYA, Esq.
KENJI KODAMÁ, Esq.
KIMPEI TAKEUCHI, Esq.
TARO HODSUMI, Esq.

Head Office: YOKOHAMA
Manager: H. MORI., Esq.

TOKYO BRANCH
No. 1, Itchome, Eirakucho, Kojimachi-ku.
Manager: K. MOGAMI, Esq.

BRANCHES AND AGENCIES.

Batavia	Dairen	Hongkong	Los Angeles	Nagasaki	Rangoon	Shanghai	Saigon
Bombay	Fengtien	Honolulu	*(sub-office of San Francisco*	Newchwang	Rio de Janeiro	Shimonoseki	Tientsin
Buenos Aires	Hamburg	Kaiyuang	*Branch)*	New York	Saigon	Singapore	Tsingtau
Calcutta	Hankow	Kobe	Lyons	Osaka	San Francisco	Sydney	Tsinan
Changchun	Harbin	London	Manila	Peking	Seattle	Sourabaya	Vladivostock

LONDON BANKERS

LLOYD'S BANK, LIMITED
LONDON COUNTY WESTMINSTER AND PARR'S BANK, LIMITED
NATIONAL PROVINCIAL AND UNION BANK OF ENGLAND, LIMITED
LONDON JOINT CITY AND MIDLAND BANK, LIMITED

Interest allowed on Current Accounts and Fixed Deposits on terms to be ascertained on application.
Every description of Banking business transacted.
For particulars, apply to the managers.

THE FIRM OF SUMITOMO

OWNERS OF BESSHI COPPER MINE, COAL MINE, ETC.

MANUFACTURERS OF

Tubes, Plates, Sheets and Bars of Copper Brass, Bronze and other Copper Alloys, Solid Drawn Steel Tubes, Nails, Electric Wires and Cables, Artificial Fertilizer, etc.

WORKS AND DEPARTMENTS

General Head Office	Osaka	Tokyo Sales Department	Tokyo
Besshi Copper Mine Office	Niihama, Iyo	Kure Sales Department	Kure near Hiroshima
Copper Sales Department	Osaka & Kobe	Yokosuka Sales Department	Yokosuka
Warehouses	Osaka, Kobe & Toyko	Hakata Sales Department	Hakata
Wakamatsu Coal Department	Wakamatsu, Chikuzen	The Sumitomo Yoko	Shanghai
Copper Works	Osaka & Amagasaki	The Sumitomo Yoko	Hankow
Electric Wire and Cable Works	Osaka	The Sumitomo Yoko	Tientsin
Fertilizer Manufactory	Niihama, Iyo	The Sumitomo Bank of Hawaii	Honolulu
Sapporo Mine Office	Sapporo, Hokkaido	The Sumitomo Bank of Seattle	Seattle

THE SUMITOMO STEEL WORKS, LIMITED

OSAKA, JAPAN

President: Baron K. SUMITOMO

MANUFACTURERS OF

Steel Ingots, Steel Forgings, Steel and Iron Castings of every description for Railways, Shipbuilding Yards, Mines, Hydraulic, Electric and other Engineering Works, etc. etc.

THE SUMITOMO BANK, LIMITED

OSAKA, JAPAN

Cable Address: "SUMITBANK"

President: Baron K. SUMITOMO

Capital Subscribed	Yen 70,000,000	Reserve Fund	Yen 12,000,000
Capital Paid-up	" 40,000,000	Deposits (30th June, 1920)	" 360,000,000

HOME BRANCHES:

Tokyo, Yokohama, Nagoya, Kyoto, Kobe, Hyogo, Onomichi, Niihama, Kure, Hiroshima, Yanai, Shimonoseki, Moji, Kokura, Wakamatsu, Hakata, Kurume.

FOREIGN OFFICES:

New York, San Francisco, Shanghai, Hankow, Bombay, London, Seattle (Affiliated Bank), Hawaii (Affiliated Bank).

AGENTS:

National City Bank of New York, New York. Lloyds Bank Ltd., London.

The Bank buys, sells and receive for collection Drafts and Telegraphic Transfers, issues Commercial and Travellers Letters of Credit available in all important parts of the world, besides doing general Banking business.

THE

MITSUBISHI BANK,

LIMITED

CAPITAL SUBSCRIBED - Yen 50,000,000

CAPITAL PAID-UP - - - Yen 30,000,000

PRESIDENT:

Baron Koyata Iwasaki

MANAGING DIRECTORS:

Mr. Manzo Kushida — Mr. Mikitaro Kikuchi

Mr. Kiyoshi Sejimo — Mr. Takeo Kato

HEAD OFFICE:

No. 1 Yayesucho Itchome, Kojimachi-ku,
Tokyo, Japan.

BRANCH OFFICES:

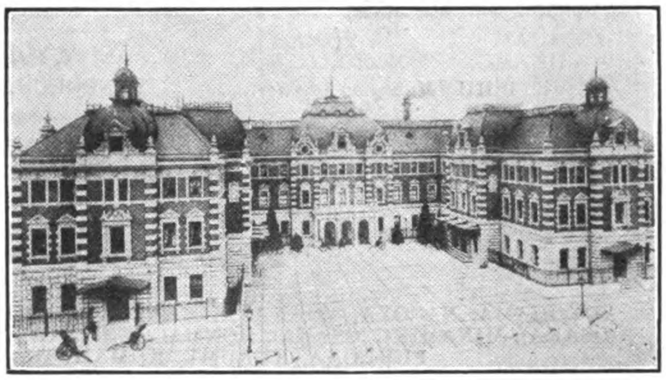
Fukagawa (Tokyo), Marunouchi (Tokyo), Nihombashi (Tokyo), Osaka, Nakanoshima (Osaka), Kobe, Kyoto, Nagoya, Shanghai, New York and London.

General Banking and Exchange Business

Agents for Hongkong and Shanghai Banking Corporation

THE MITSUI BANK, LTD.

The Oldest Bank in Japan, Founded in 1680



Capital Subscribed.................Y. 100,000,000.00
Capital Paid-Up.....................Y. 60,000,000.00
Reserve Fund (Jan. 1921)......Y. 27,000,000.00

HEAD OFFICE:

No. 1 Suruga-cho, Nihonbashi-ku,
TOKYO

BOARD OF DIRECTORS:

GENYEMON MITSUI, Esq. (*President*); SEIHIN IKEDA, Esq., UMEKICHI YONEYAMA, Esq., NAOJIRO KIKUMOTO, Esq. and OTOHIKO MAJIMA, Esq. (*Managing Directors.*)

MORINOSUKE MITSUI, Esq., TOMITARO HARA, Esq., KANETARO KISHIMOTO, Esq., HIROKICHI KAMESHIMA, Esq. and KIKUSABURO FUKUI, Esq. (*Directors*).

Branches:

OTARU, FUKAGAWA (Tokyo), HAKOZAKI (Tokyo), YOKOHAMA, NAGOYA, KYOTO, OSAKA, NISHI (Osaka), KAWAGUCHI (Osaka), NAKANOSHIMA (Osaka), KOBE, HIROSHIMA, SHIMONOSEKI, MOJI, WAKAMATSU, FUKUOKA, NAGASAKI, SHANGHAI.

Foreign Agents:

London: Barclays Bank, Ltd.
London Joint City & Midland Bank, Ltd.

New York: The National City Bank of New York.
The Chase National Bank.
Bankers Trust Co.

Paris: Banque de l'Union Parisienne.
Comptoir National d'Escompte de Paris.

Bombay: National Bank of India, Ltd.

THE DAI-ICHI GINKO, LTD.

(FORMERLY THE FIRST NATIONAL BANK)

ESTABLISHED 1873

Subscribed Capital	- - -	Yen 50,000,000.00
Paid-Up Capital	- - - -	Yen 29,525,000.00
Reserve Fund	- - - -	Yen 28,000,000.00

Y. SASAKI, *President*

K. ISHII, *Managing Director.* Y. NOGUCHI, *Managing Director.* S. SUGITA, *Managing Director.*

HEAD OFFICE:

No. 1 KABUTO-CHO, NIHONBASHI-KU, TOKYO.

T. AKASHI, *Manager*

CITY BRANCHES:

ISECHO, SHIN-OSAKACHO, FUKAGAWA, MARUNOUCHI.

HOME BRANCHES:

YOKOHAMA, NAGOYA, YOKKAICHI, KYOTO, NISHIJIN (KYOTO), GOJO (KYOTO), FUSHIMI, OSAKA, NISHIKU (OSAKA), MINAMIKU (OSAKA), HONMACHI (OSAKA), KOBE, HYOGO, HIROSHIMA, SHIMONOSEKI, CHOFU, MOJI, FUKUOKA, KURUME, KUMAMOTO, HAKODATE, OTARU, SAPPORO, MURORAN.

BRANCHES IN COREA:

SEOUL, FUSAN.

LONDON & NEW YORK BANKERS:

London: London County Westminster & Parr's Bank, Ltd.; The London Joint City & Midland Bank, Ltd.; The Yokohama Specie Bank, Ltd.

New York: The National City Bank of New York.; The National Bank of Commerce in New York.; The Yokohama Specie Bank, Ltd.

CORRESPONDENTS:

The Bank, in addition to its own Branches, has numerous Agencies or Correspondents in the principal Cities and Towns at Home and Abroad.

THE EAST ASIA INDUSTRIAL

COMPANY, LIMITED

(TOA KOGYO KABUSHIKI KAISHA)

TOKYO

ESTABLISHED 1909

FINANCIERS AND CONTRACTORS

K. ARAI, Esq., *President*

R. SHIRAIWA, Esq., *Managing Director*

Subscribed Capital	. . . . . .	Yen 20,000,000
Paid-up Capital	. . . . . .	„ 11,500,000

Branches: SHANGHAI, PEKING, HANKOW.

Hongkong and Shanghai Banking Corporation

Paid-up Capital	$15,000,000
Reserve Funds: Sterling	£2,500,000
Silver	$21,500,000
Reserve Liability of Proprietors	$15,500,000

Court of Directors:

G. T. M. EDKINS, Esq.
Chairman

G. M. DODWELL, Esq.
Deputy Chairman

D. G. M. BERNARD, Esq.
A. S. GUBBAY, Esq.
Hon. Mr. P. H. HOLYOAK
A. O. LANG, Esq.
Hon. Mr. E. V. D. PARR
W. L. PATTENDEN, Esq.
J. A. PLUMMER, Esq.
H. P. WHITE, Esq.

Head Office:
HONGKONG

Chief Manager:
HONGKONG . . . Hon. Mr. A. G. STEPHEN

London Bankers:
LONDON COUNTY WESTMINSTER AND PARR'S BANK LTD.

Shanghai Branch: 12 The Bund
Sub-Agency: 9 Broadway

Branches and Agencies:

AMOY	MALACCA
BANGKOK	MANILA
BATAVIA	NAGASAKI
BOMBAY	NEW YORK
CALCUTTA	PEKING
CANTON	PENANG
COLOMBO	RANGOON
FOOCHOW	SAIGON
HANKOW	S. FRANCISCO
HARBIN	SHANGHAI
ILOILO	SINGAPORE
IPOH	SOURABAYA
JOHORE	TIENTSIN
KOBE	TSINGTAO
KUALA LUMPUR	VLADIVOSTOCK
LONDON	YOKOHAMA
LYONS	

Interest allowed on Current Accounts and on Fixed Deposits according to arrangement.

Local Bills Discounted. Credits granted on approved Securities and every description of Banking and Exchange business transacted. Drafts granted on London and the chief commercial places in Europe, India, Australia, Africa, China, Japan and America.

G. H. STITT, *Acting Manager.*

THE JUGO GINKO, Ltd.

(THE FIFTEENTH BANK)

TOKYO, JAPAN

Telegrams: "Jugoginko, Tokio"

Capital Subscribed Y. 100,000,000 Capital Paid-Up Y. 49,750,000 Reserve Funds Y. 17,478,600

President:
HON. IWAO MATSUKATA

Vice-President:
MASAYASU NARUSE, Esq.

Managing-Directors:
YUTSUHA SATO, Esq. KANESATO AIKO, Esq.

Directors:
BARON KOKICHI SONODA
MARQUIS YORIMICHI TOKUGAWA
VISCOUNT YUKIYOSHI AOYAMA
HON. NAGAYUKI ASANO
YOSHITERU SHIMIZU, Esq.
MASAO MATSUKATA, Esq.
KIYOSUMI TANIKAWA, Esq.

Auditors:
MASAKAZU HISANO, Esq.
BARON MICHITOMO IWAKURA
NAOYOSHI YAMAMOTO, Esq.
TAKAJI SEKIGUCHI, Esq.
TAKAYUKI IMAI, Esq.

***Head Office Manager:* Kiyosumu Tanikawa, Esq.**

LONDON BANKS AND AGENTS:

LAZARD BROTHERS & CO., LTD. UNION DISCOUNT CO. OF LONDON, LTD.
LONDON COUNTY WESTMINSTER AND PARR'S BANK, LTD.

BANK OF COMMUNICATIONS

(Specially authorised by Presidential Mandates of April 7th, 1914 and October 31st, 1915 making the Bank of Communications a National Bank).

Head Office: Peking

CAPITAL . . Kuping Tls. 10,000,000

President: TSAO JOU LIN

Vice-President: JEN FUNG PAO

Every description of Banking and Exchange business transacted.
Interest allowed on Current Accounts and Fixed Deposits according to arrangement.
Credits granted on approved Securities.
Special Facilities for Transfers to all parts of China.

Branches

CHIHLI PROVINCE.—Peking, Tientsin, Tungchow, Paotingfu, Haitien, Tangshan, Shuntefu, Shengfang.

SHANTUNG PROVINCE.—Tsinanfu, Tsininchow, Chefoo, Techow, Tsaochwang, Lungkow.

HONAN PROVINCE.—Kaifeng, Lohyang, Chengchow, Chiaotso, Chowchiakow, Taokow, Leiho, Hsinhsiang, Changtefu, Hsinyangchow.

SHANSI PROVINCE.—Shihchiachwang, Tatungfu, Fengcheng, Yangkao.

KIANGSU PROVINCE.—Shanghai, Soochow, Wusieh, Chinkiang, Yangchow, Tsing-kiangpu, Pukow, Penpu, Hsuchow.

CHEKIANG PROVINCE.—Hangchow, Ningpo.

HUPEH PROVINCE.—Hankow, Shasi, Ichang.

KIANGSI PROVINCE.—Kiukiang.

HUNAN PROVINCE.—Changsha, Changteh, Yochow, Hengchow, Hsiangtan

SZECHUAN PROVINCE.—Chungking.

ANHWEI PROVINCE.—Wuhu, Anking, Hsuancheng, Panpu

KWANGTUNG PROVINCE.—Canton.

THREE EASTERN PROVINCES.—Yinkow, Fengtien, Changchun, Kirin, Tiehling, Sunchiatai, Liaoyang, Harbin, Chinhsien.

SPECIAL DISTRICTS.—Jehol, Kueihuacheng, Lenghsien, Chihfeng, Hsinsi, Kalgan (Chahar).

ABROAD.—Hongkong, Singapore.

Industrial Bank of Japan, Limited

(NIPPON KOGYO GINKO)

Incorporated by Special Charter in 1902 to Encourage Foreign Investments

CAPITAL SUBSCRIBED - - - - - - Yen 50,000,000
CAPITAL PAID-UP - - - - - - - Yen 45,000,000

HEAD OFFICE:
MARUNOUCHI, TOKYO. CABLES "KOGIN," TOKYO

BRANCHES:
TOKYO: NIHONBASHI
OSAKA: KORAIBASHI
KOBE: NAKAMACHI

H. HIJIKATA, Esq., President
Y. ONO, Esq., Vice-President
K. IYANAGA, Esq., Director
T. IWASA, Esq., Director
KOZO MATSUMOTO, Esq.

AUDITORS:
NAGATANE SOMA, Esq.
KINTARO HATTORI, Esq.
KINICHI KAWAKAMI, Esq.
TAICHI OHBA, Esq.

All descriptions of general banking, exchange, both foreign and domestic, and trust and corporation financial business transacted.

Correspondents in the principal cities at home, and in London, Paris, New York, and San Francisco.

BUSINESS TRANSACTED:

1.—Loans on the security of public bonds of debentures and shares, estates (Zaidan), specified land and buildings.
2.—Subscription and underwriting public bonds or debentures.
3.—Deposits and safe custody of valuables.
4.—Trust company business.
5.—Discounting of bills.
6.—Foreign exchange business.
7.—Other banking business sanctioned by the Minister of State for Finance in accordance with Law of Ordinance.

AMERICA-JAPAN-CHINA TRUST COMPANY, LIMITED

HEAD OFFICE:

6 Nakabashi Izumicho, Kyobashi-ku, Tokyo.

BRANCH OFFICE:

11 Imabashi Nichome, Higashiku, Osaka.

CAPITAL - - Y. 50,000,000.00

Directors:

Michitaka Sugawara, *Chairman*
Seiji Nawa, *Managing Director*
Toyotsune Mikami
Count Kinjiro Hirosawa
Wu Ting Chang
Kenji Imanishi, *Managing Director*
Taiji Arai
Seishichi Iwasaki
Saburosuke Fujisaki
F. N. Shea

Auditors:

Kanzo Matsuo, Standing
Toyohiko Kuki
Motosaburo Kaneko
Takayoshi Kondo

Councillors:

Raizo Kanda
Katsutaro Kamada

***Principal Business of this Company as follows*:**

1. Financing of Domestic and Foreign Enterprises.
2. Underwriting Public Bonds, Debentures and other Securities.
3. Guaranteeing Loans, Debts and Credits.
4. Issuing Letters of Credit and Accepting Bills.
5. Assisting in the Organization of various enterprises and in the financial re-adjustment of Companies.
6. All other kinds of Trust Business.

SOUTH AMERICA

HEAD OFFICE: MONTREAL, CANADA

We offer a complete banking service in the following countries, special attention being given to the handling of collections.

ARGENTINE Buenos Aires. **BRAZIL** Rio de Janeiro, Santos, Sao Paulo. **URUGUAY** Montevideo.

VENEZUELA Caracas, Ciudad Bolivar, Maracaibo, Puerto Cabello. **COLOMBIA** Barranquilla. **BR. GUIANA** Georgetown, Rose Hall, New Amsterdam.

Also 81 Branches in

CUBA, PORTO RICO, DOMINICAN REPUBLIC, HAITI, COSTA RICA, BR. HONDURAS, BRITISH WEST INDIES and FRENCH WEST INDIES

617 Branches throughout CANADA & NEWFOUNDLAND

LONDON Princes St., E.C. **PARIS** 28, Rue du Quatre-Septembre. **NEW YORK** 68, William St. **BARCELONA** Plaza de Cataluna 6.

THE ROYAL BANK OF CANADA

CAPITAL PAID UP & RESERVES $40,000,000
TOTAL RESOURCES OVER - $600,000,000

The First National Bank of Boston

Transacts commercial banking business of every nature

Correspondence Solicited

Capital, Surplus and Profits

$37,500,000

THE BANK OF CHOSEN

Capital Subscribed - - - Yen 80,000,000
Capital Paid-up - - - Yen 50,000,000

Governor: S. Minobe, Esq.
Deputy-Governor: T. Kano, Esq.

Directors:

S. Ohta, Esq. S. Katayama, Esq.
S. Yoshida, Esq. S. Kakei, Esq.

Head Office: SEOUL (Chosen)

FOREIGN DEPARTMENT: TOKYO

(All communications relating to correspondence arrangements and the Bank's general foreign business to be addressed to the Foreign Department)

Branches:

Japan Proper—Tokyo, Osaka, Kobe, Shimonoseki
Korea—Chemulpo, Pyengyang, Fusan, Wonsan, Taiku, Chinnampo, Kunsan, Mokpo, Hoilyong, Chongjin
Manchuria—Antung, Fengtien (Mukden), Dairen, Yingkow (Newchwang), Changchun, Harbin, Tiehling, Liaoyang, Ryojun, Kaiyuan, Chengchiatun, Szupingchieh, Fuchiatien, Kirin, Lungchingtsun
China Proper—Shanghai, Tientsin, Tsingtao, Tsinan
Siberia—Vladivostock, Alexandrofsky Post

NEW YORK AGENCY:

The City Investing Building, 165 Broadway, New York City

LONDON REPRESENTATIVE:

Gresham House, 24 Old Broad Street, London, E. C. 2

Correspondents:

San Francisco, Seattle, New York, London, Paris and in other commercial centers throughout the world

Cable Address:
"IWASAKISAI, TOKYO"

Code Used:
A. 1., A.B.C. 5th, Western Union, Bentley's Complete Phrase

MITSUBISHI SHOJI KAISHA, LD.

(MITSUBISHI TRADING CO., LTD.)

Capital, fully paid-up - - - Y. 15,000,000

Head Office:
MARUNOUCHI, TOKYO.

Importers and Exporters, Manufacturers, Commission Merchants, Brokers, Ship Owners.

EXPORTING:

Coal, Copper and all Other Descriptions of Metals, Minerals and Cereals, Chemicals, Oil, Paper, Glass, Canned Fish, Silk Goods, and General Oriental Products and Merchandise

IMPORTING:

Iron, Steel, Machinery, Machine Tools, Chemicals, and General Merchandise

ANNUAL PRODUCTION:

Electrolytic Copper Ingots	20,000	Tons
Pig Iron	100,000	„
Steel	50,000	„
Coal	3,500,000	„

COLLIERIES:

Takashima, Ochi, Yoshinotani, Kishidake, Namazuta, Shinnew, Hojo, Kanada, Kamiyamada, Ashibetsu, Bibai, O-Yubari, and Sakito

BRANCHES and AGENCIES:

Tokyo, Yokohama, Nagoya, Osaka, Kobe, Moji, Wakamatsu, Karatsu, Nagasaki, Otaru, Tsuruga, Kure, Muroran, Hakodate, Kushiro, Vladivostok, Dairen, Kirin, Harbin, Peking, Shanghai, Hankow, Hongkong, Canton, Tientsin, Tsingtao, Tsinan, Singapore, London, Paris, Lyon, Marseilles, Berlin, New York, Seattle.

STEAMSHIP DEPARTMENT—KOBE

Fleet Owned	25,000	Tons Gross
Chartered Steamers	12,000	„ „

Regular and Irregular Routes between home ports and Chinese and South Sea Islands Ports, etc.

MIIKE COAL

The Finest Steaming and Bunker Coals of the Far East are mined from the famed Miike, Tagawa, Yamano, Sunakawa and Kawakami Collieries operated by the

MITSUI

MINING COMPANY, LTD.

HEAD OFFICE:
No. 1 Surugacho, Nihonbashi-Ku,
TOKYO, JAPAN

Capital - - Yen 100,000,000

Annual Coal Output is equal to one-quarter of Total Japanese Mines.

LEAD, SILVER, GOLD, ZINC, COPPER, SPELTER, SULPHUR, COKE, IRON, CHEMICALS and DYES

Are produced from the Company's, KAMIOKA, Lead, Silver and Zinc Mine; SANO, Copper and Zinc Mine; KUSHIKINO, Gold Mine; KONGO, Tungsten Mine; IWAONOBORI, Sulphur and Metal Mine; Zinc Plants, Coke, Dyestuffs and By-products Establishments in Miike.

Sole Agents for our Products:

MITSUI BUSSAN KAISHA, Ltd.

(MITSUI & Co., Ltd.)

Tokyo, London, New York, Shanghai, Hongkong, and other Principal Commercial Centres of the World.

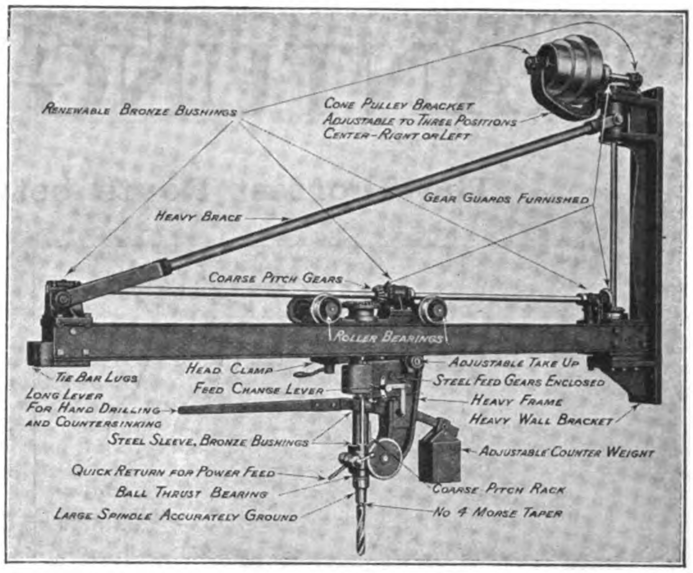
A Real Machine Tool

This Wall Radial Drill is a real machine tool in every sense of the word. It is properly designed and carefully constructed of the finest materials obtainable. Every feature has been added to insure ease of operation and accurate output. Your factory walls form the column of this machine and it proves as rigid under strain as any machine on the floor.

You save in first cost, floor space and operating time by insisting on L-F Wall Radial Drills.

Get the full details from bulletin. They make interesting reading.

GET IT TO-DAY.



LYND-FARQUHAR CO.

Machine Tools of Quality.

419-425 ATLANTIC AVE.,

Boston 9, Mass., U.S.A.

MADE IN FOUR STANDARD SIZES

Rated size	Drills to centre of	Wall to end of arm
7-ft.	14-ft. circle	10-ft.
9-ft.	18-ft. circle	12-ft.
11-ft.	22-ft. circle	14-ft.
13-ft.	26-ft. circle	16-ft.

Other lengths of arm to suit requirements.

IRON AND STEEL TUBES

for Gas, Water, Air, Steam, Oil, Sewage, Irrigation & other purposes

Black and Galvanized Tubes and Fittings.
Boiler Tubes · Weldless Steel Tubes · Boring Tubes.
: Main Steam Pipe Installations. :
Tubular Steel Tramway & Electric Light Poles.
Ashford's Patent Tube Well Strainers.
Steel Plates. ——— Steel Castings.

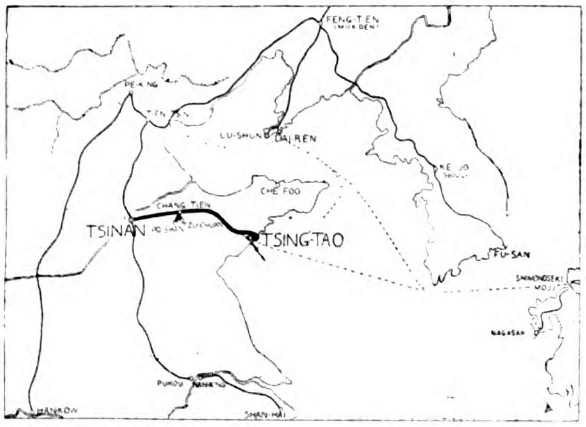
STEWARTS AND LLOYDS, LTD.

GLASGOW BIRMINGHAM LONDON

SHANGHAI OFFICE: 6 KIUKIANG ROAD

SHANTUNG RAILWAY

The Shortest Route between Japan and North China



THROUGH TRAFFIC

Through passenger tickets are issued between the following principal stations of the Shantung Railway: Kiaochow, Kaomi, Fangtsu, Weihsien, Chingchow, Changtien, Chowtsun, Tsinan, Tzuchuan, Poshan, and the following points: In Manchuria—Port Arthur, Newchwang, Liaoyang, Fushun, Mukden, Tiehling, Kaiyuan, Changchun, Penchihu, Antung, and Dairen; in Japan—Tokyo, Yokohama, Nagoya, Kyoto, Osaka, Kobe, Ujina, Moji, Shimonoseki, Nagasaki and Shanghai.

Steamer Connections—Steamers leave the wharves of the Large Harbour, Tsingtao, for Moji and Kobe every five days, for Shanghai about twice a week and for Dairen about three times a week.

For giving facilities to through passengers for Japan, a special train in connection with the night train No. 4 is operated from the Harbour Station to the Wharf, direct alongside the ship, on those days when the liners of the Nippon Yusen Kaisha, Osaka Shosen Kaisha, and Harada S.S. Co. are leaving.

Through passengers and their luggage are carried free of charge for this section.

Collieries—The Tzuchuan (Shisen) and Fangtzu (Boshi) Collieries are managed by the Mining Department of the Shantung Railway. At present the daily output of Tzuchuan coal is about 1,500 tons, far surpassing the amount taken out when the Germans were in control. The coal is well-known for its good quality and fair price.

Tsinan—Tsinan, the capital of Shantung, is the western terminus of the Shantung Railway, and also one of the most important stations on the Tientsin-Pukow Railway.

The Tsinan Railway Hotel, furnished in modern European style, is found on the upper floor of the Tsinan Station, under the control of the Shantung Railway Administration.

THROUGH TRAIN SERVICE

Train No. 1	leaves Tsingtao	daily 8.00 a.m.	arrives Tsinan	6.30 p.m.
Train No. 3	leaves Tsingtao	daily 7.00 p.m.	arrives Tsinan	7.00 a.m.
Train No. 2	leaves Tsinan	daily 9.00 a.m.	arrives Tsingtao	7.30 p.m.
Train No. 4	leaves Tsinan	daily 9.30 p.m.	arrives Tsingtao	9.10 a.m.

Local Trains run between Tsingtao and Kaohi, Weihsien and between Fangtzu and Tsinan, and on the Poshan and Tzuchuan colliery branches.

Fares—Tsingtao-Tsinan—1st class, $14.30; 2nd class, $7.20.

First Class Sleeping Car—A first-class sleeping car is attached to night trains Nos. 3 and 4 running between Tsingtao and Tsinan. For a berth in the sleeping car in S.Y. 3.00 for the lower berth and S.Y. 2.00 for the upper berth is charged in addition to the ordinary first-class fare, irrespective of distance.

Dining Car—A dining car is attached to through trains Nos. 1, 2, 3 and 4 running between Tsingtao and Tsinan. Meals are served to order at any time.

Ticket Agencies—Messrs. Thos. Cook & Son and their branch offices in various parts of the world. The Japan Tourist Bureau in Tokyo and their Agents in Yokohama, Kobe, Nagasaki and Peking.

Connections at Tsingtao—By steamer with Japan, Manchuria and Shanghai.

Connections at Tsinan—By Tientsin-Pukow Line with Tientsin, 6.00 & 9.38 a.m. daily, and with Pukow, 7.43 & 10.21 p.m. daily.

BATHING BEACH, TSINGTAO.

Description of Tsingtao

Tsingtao is considered the most healthful place in all the Far East. The scenery including both mountains and sea, is most beautiful. There are quite extensive forest gardens, bits of woodland here and there, and many delightful shady lanes affording most interesting walks through them.

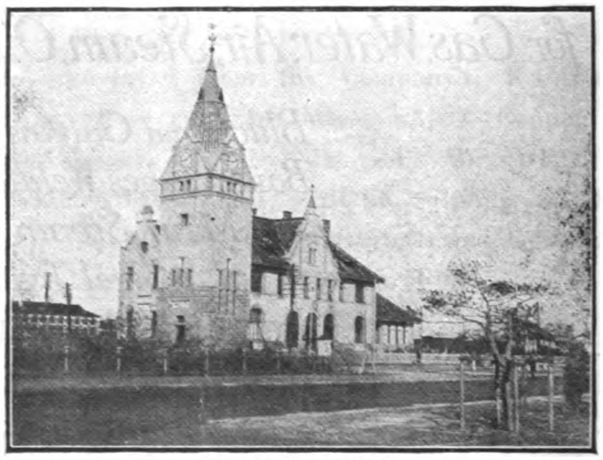
The roads are all broad, with very moderate gradients. They are of both macadamized and asphalt construction for vehicle traffic, while the sidewalks are either paved or concrete. These streets are practically all lined with beautiful shade trees.

The buildings are constructed principally in modern European style, with red tiles and white walls, contrasting pleasantly with the surrounding green mountains and blue sea.

The climate here is fine from Spring to Autumn, being neither too hot nor too cold. These climatic conditions make the place a favourite summer resort for Europeans and Americans from Shanghai, Tientsin, and other places.

The hotels are luxuriously furnished with up-to-date equipment and are under the efficient management of Mr. H. J. Hearne.

The hotel rates are $6.00 and up, per day, on the American plan.



TSINGTAU STATION

For Further Information, please apply to

THE SHANTUNG RAILWAY ADMINISTRATION, TSINGTAO

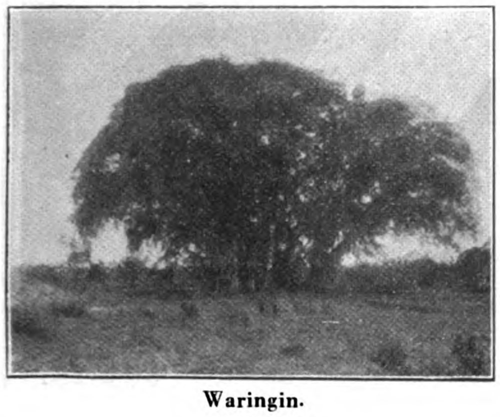
CABLE ADDRESS: "SANTETSU" CODES: A.B.C. 5TH ED. & AI.

JAVA—THE WONDERLAND

HAVE YOU NOT YET VISITED JAVA?
IF NOT, DO SO NOW!

Bridge Bi Cis, Soerabaia Goods-shed, Java State Railways, Soerabaia City.

Girl Carrying Capoc.



Waringin.

Java, the peerless gem in that "magnificent Empire of Insulinde, which winds about the equator like a garland of emeralds," is the ideal tropical island, the greenest, the most beautiful and the most exquisitely cultivated spot in the East, the most picturesque and satisfactory bit of the tropics anywhere near the world's great routes of travel.

It fulfils the conception of what a paradise ought to be. It satisfies the imagination and more—for no Northern imagination ever conceived of skies so soft or indolent as these, of seas so serene and beautiful, of landscapes so exquisite or of nature so bountiful.

There is something here for every taste. The sportsman will find excellent big game shooting—the architect and the archeologist will delight in exploring the ruins of Buddhistic and Hinduistic temples. Those studying social and political problems resulting from colonial possessions can study here one of the most successful colonial systems existing. The geologist will grow enthusiastic over the many volcanoes active or quiescent, found here. At Buitenzorg, one hour's run from Batavia, the botanist has at his disposition the largest and best equipped Botanical gardens of the universe. The agriculturist will delight in the many cultures as f.i. rice, tea, coffee, rubber, etc., found here. Moreover, travelers are entirely safe in Java and even ladies alone can tour the island without inconvenience.

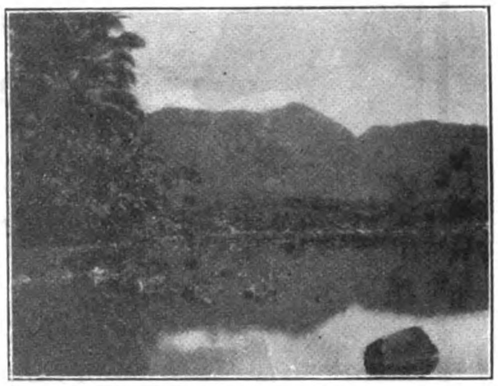
And to close this incomplete list of Java's advantages, it is singularly accommodating as regards climate. Thanks to the mountainous character of its physical conformation, and the different altitudes of its towns and hill stations, the visitor can select the climate best suited for his constitution. In a few hours he may change from the tropics to the temperate zone, may migrate from Batavia to Sindanglaja, 3,483 feet above the sea-level, or from Soerabaia to Tosari, at an altitude of 5,776 feet, and famous for its bracing air.

Few tourist playgrounds, in fact, are so favored, or possess a greater variety of attractive features.

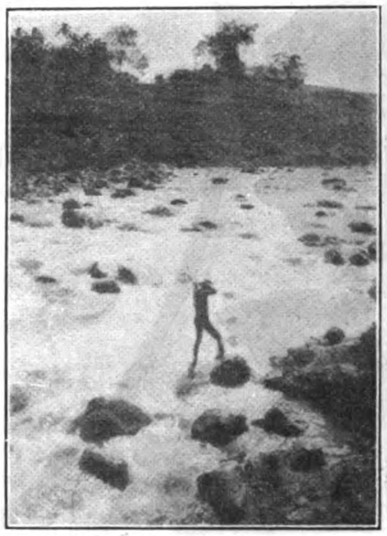
THE JAVA GOVERNMENT RAILWAYS own 2,629 miles of thoroughly equipped lines, passing through all the principal Tourist centres.

Comfortable travelling—frequent express and fast trains. Restaurant cars with efficient service in all express and fast trains.

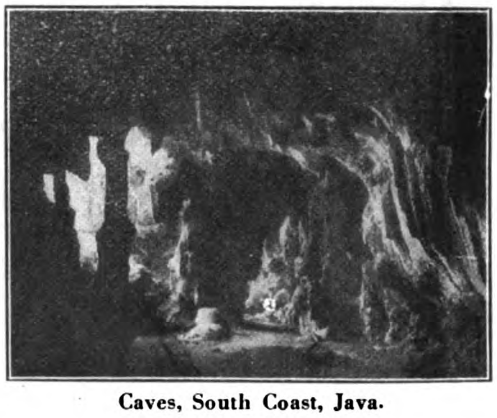
For full information and literature apply to the "Official Tourist Bureau" at Weltevreden, Rijswijk 18.



Pond in the Neighborhood of Garoet.



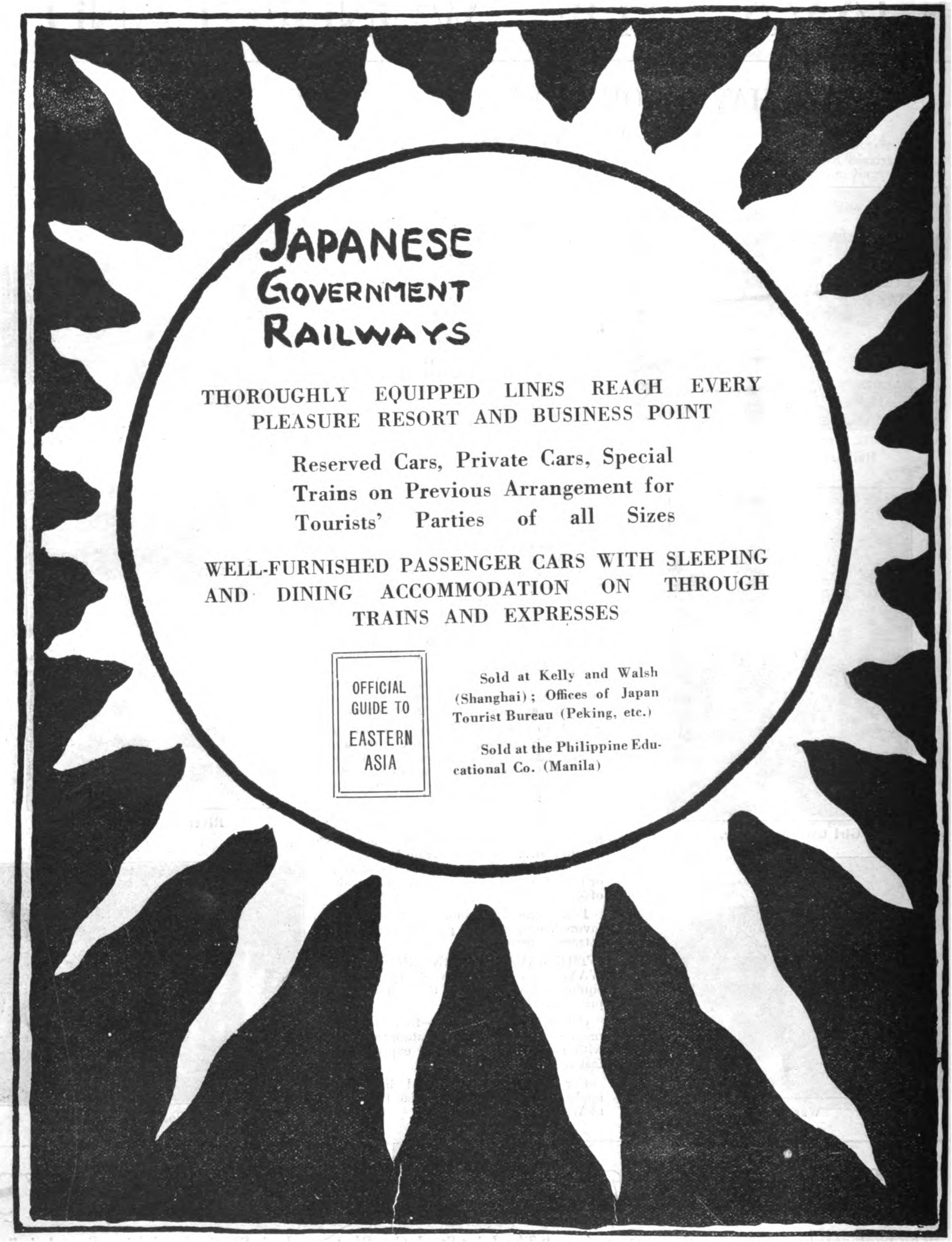
River Brantas, Malang.

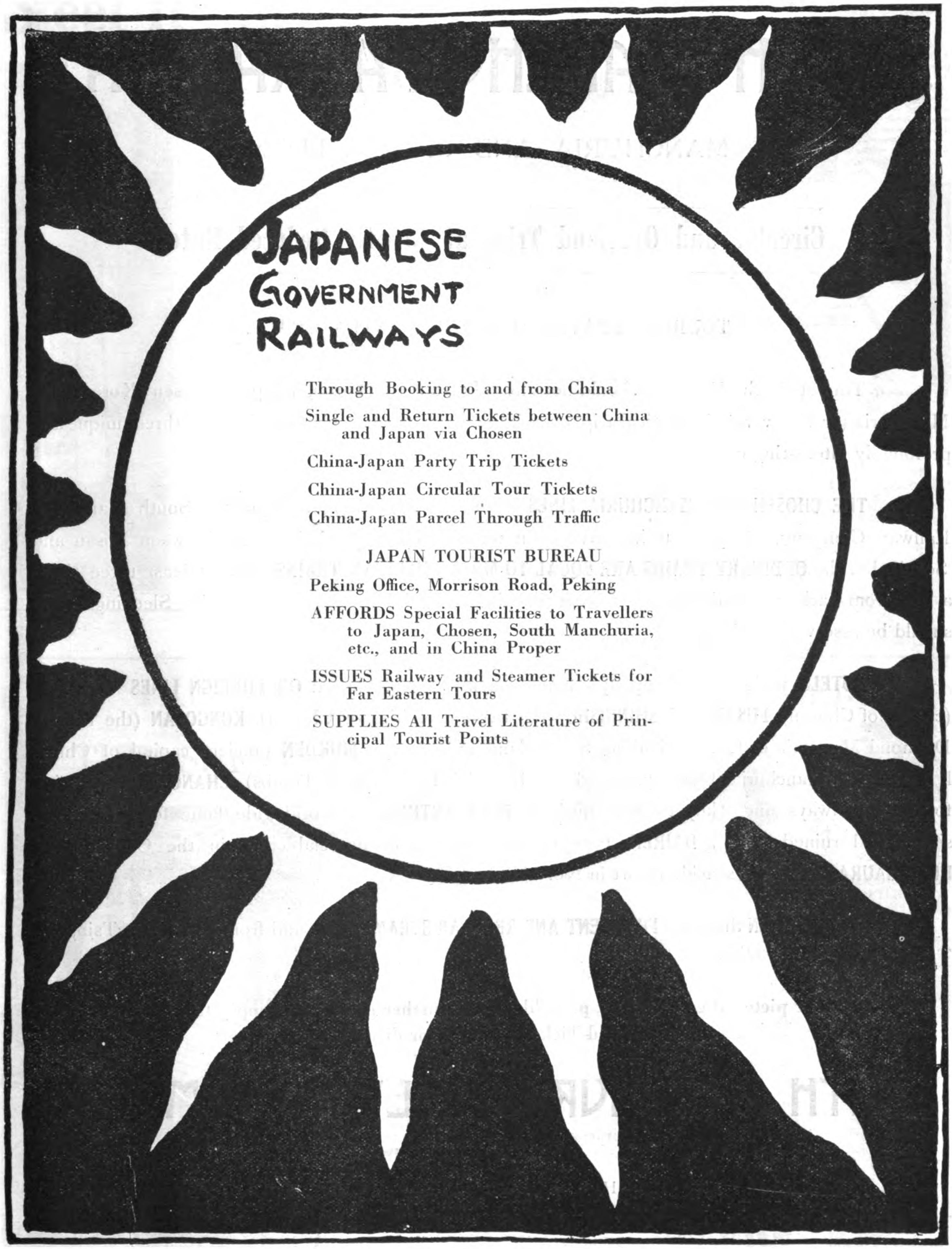


Caves, South Coast, Java.

THE JAVA GOVERNMENT RAILWAYS

The photographs in this advertisement are from "The Joint-Stock Co., Photographer's Studio, Kurkdjian, Soerabaia."


JAPANESE
GOVERNMENT
RAILWAYS
THOROUGHLY EQUIPPED LINES REACH EVERY PLEASURE RESORT AND BUSINESS POINT
Reserved Cars, Private Cars, Special Trains on Previous Arrangement for Tourists' Parties of all Sizes
WELL-FURNISHED PASSENGER CARS WITH SLEEPING AND DINING ACCOMMODATION ON THROUGH TRAINS AND EXPRESSES
OFFICIAL GUIDE TO EASTERN ASIA
Sold at Kelly and Walsh (Shanghai); Offices of Japan Tourist Bureau (Peking, etc.)
Sold at the Philippine Educational Co. (Manila)


JAPANESE
GOVERNMENT
RAILWAYS
Through Booking to and from China
Single and Return Tickets between China and Japan via Chosen
China-Japan Party Trip Tickets
China-Japan Circular Tour Tickets
China-Japan Parcel Through Traffic
JAPAN TOURIST BUREAU
Peking Office, Morrison Road, Peking
AFFORDS Special Facilities to Travellers to Japan, Chosen, South Manchuria, etc., and in China Proper
ISSUES Railway and Steamer Tickets for Far Eastern Tours
SUPPLIES All Travel Literature of Principal Tourist Points

SOUTH MANCHURIA RAILWAY

MANCHURIA AND CHOSEN LINES

Circular and Overland Trips at Greatly Reduced Rates

TOURIST TRAVEL OFF THE BEATEN TRACK

Tourists in the Far East should not miss Manchuria. Through Japan, Chosen (Korea), and Manchuria (or vice versâ) is an ideal trip, combining the distinctive characteristics of three unique and profoundly interesting countries.

THE CHOSEN AND MANCHURIA LINES are under the management of the South Manchuria Railway Company. Express trains have been temporarily suspended (except between Fusan and Seoul), but the **ORDINARY TRAINS ARE EQUAL TO MOST AMERICAN TRAINS,** run at least three times a day from each end, and to some of them Sleeping and Dining Cars are attached. Sleeping berths should be reserved in advance.

HOTELS under the Company's management are established **ON FOREIGN LINES** at **SEOUL** (capital of Chosen), **FUSAN** and **SHINGISHU** (the two extremities of Chosen), **KONGOSAN** (the famous Diamond Mountain of Korea, rivalling Switzerland in scenery), **MUKDEN** (ancient capital of China, home of the Manchuria Dynasty, noted for Imperial Palaces and Tombs), **CHANGCHUN** (junction for three railways and "key to Manchuria"), **PORT ARTHUR** (of world-wide fame for its historic sieges and ruined forts), **DAIREN** (one of the greatest commercial cities in the Orient), and **HOSHIGAURA** (the finest seaside resort in North China).

FROM DAIREN there are **FREQUENT AND REGULAR STEAMERS** to and from Shanghai, Tsingtao, Tientsin, etc.

For pictorial guide-books, pamphlets, and further particulars, apply to the Tourist and Ticket Agencies, or direct to the

SOUTH MANCHURIA RAILWAY COMPANY

Head Office: DAIREN

Branch Offices: TOKYO, SEOUL, HARBIN, KIRIN, PEKING, SHANGHAI AND NEW YORK.

Telegraphic Address: MANTETSU or SMRCO. Codes: A.B.C. 5th & 6th Editions, A1 Lieber's, and Bentley's

Steel for Service

The All Steel elevated water tank for country estates, fire protection or municipal water supply provides a maximum of safety and service at a moderate expenditure.

A steel tank is long-lived, requires almost no outlay for upkeep, and will operate successfully in any climate.

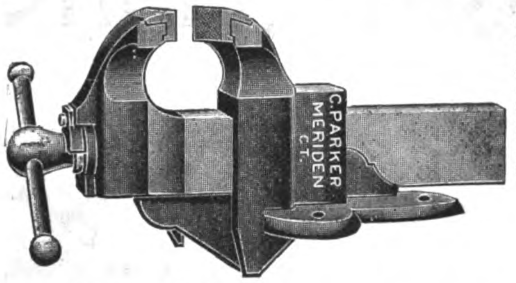
We build standard designs for Municipal water works, Automatic fire sprinkler systems and Railway locomotive service.

Detailed data in Bulletin No. 60

Chicago Bridge and Iron Works
Chicago, Illinois, U.S.A.
New York Office, 30 Church Street
Cable Address "Chibridge"

PARKER VICE JAWS are strong, durable and built for LONG SERVICE

Examine a Parker Vice. Note the grip of the strong, solid, one-piece jaw faces. Made of tool-steel, milled, tempered, and solidly fitted, they are "built to grip." These faces are removable and renewable ;—hence, should they become damaged or worn, they can readily be removed and replaced by new ones.



PARKER WOOD SCREWS, made of brass or iron, nickel-plated, galvanized or blued to resist rust, with gimlet points, uniform slots and flat, round, oval or fillister heads. Parker Vices and Wood Screws like all

PARKER'S PRODUCTS
"BUILT UP TO A STANDARD NOT DOWN TO A PRICE"

are built and fashioned for hard service and long use.

Importers and dealers reap generous profit by stocking them. Vices come with stationary or swivel base as required.

Illustrated catalogue, with attractive trade terms, sent upon request. Correspondence in all languages.

ADDRESS EXPORT DEPARTMENT, DIVISION A.

THE CHARLES PARKER CO., Inc.

We are also manufacturers of Alarm Clocks, Bath Room Accessories, Coffee Mills, Cork Pullers, Lamps, Lemon Squeezers, Piano Stools, Chairs and Benches, Shot Guns, Tinned Steel Spoons, Knives and Forks, Wood Screws.

25 Murray Street, New York, N.Y., U.S.A. Factories in Meridon, Conn., U.S.A.
ESTABLISHED 1832
Representative in India: ELLIOTT & CO., Clive Row, Calcutta, India

---

FROM THE TIN PLATE TO THE FINISHED CAN

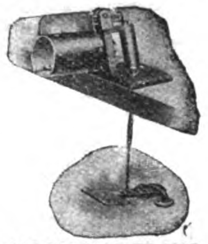
THE SHEAR

No. 302—"Bliss" Foot Shear

SHEAR
This cuts the tin plate into strips.

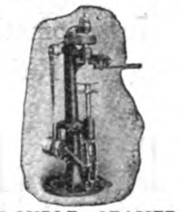
PRESS
This blanks out tops and bottoms.

ROLL FORMER
This rolls the bodies to cylindrical shape.



SOLDERING FRAME and CYLINDER
This solders the side seams.

FLANGER
This flanges both ends of can bodies.



DOUBLE SEAMER
This attaches bottoms and tops.

The first process in passing from the Tin Plate to the Finished Can is cutting out strips for tops and bottoms and body cylinders by means of the SQUARING SHEAR (the machine shown at left.)

The "BLISS" SHEAR is a tool of great accuracy and strength, far superior in every respect to the unreliable, cheaply-built shears, so commonly sold. They are very heavy and substantial and are furnished, when required, with spring-pressure clamps.

This is the second of a series of advertisement (see previous one), illustrating machines for the manufacture of packer's cans; watch for the next.

"Bliss" Can Making Machinery (one series shown at right) is suitable for making cans of all kinds, and tin packages for every purpose. **With your inquiries always send samples and state daily output desired.**

E. W. BLISS COMPANY

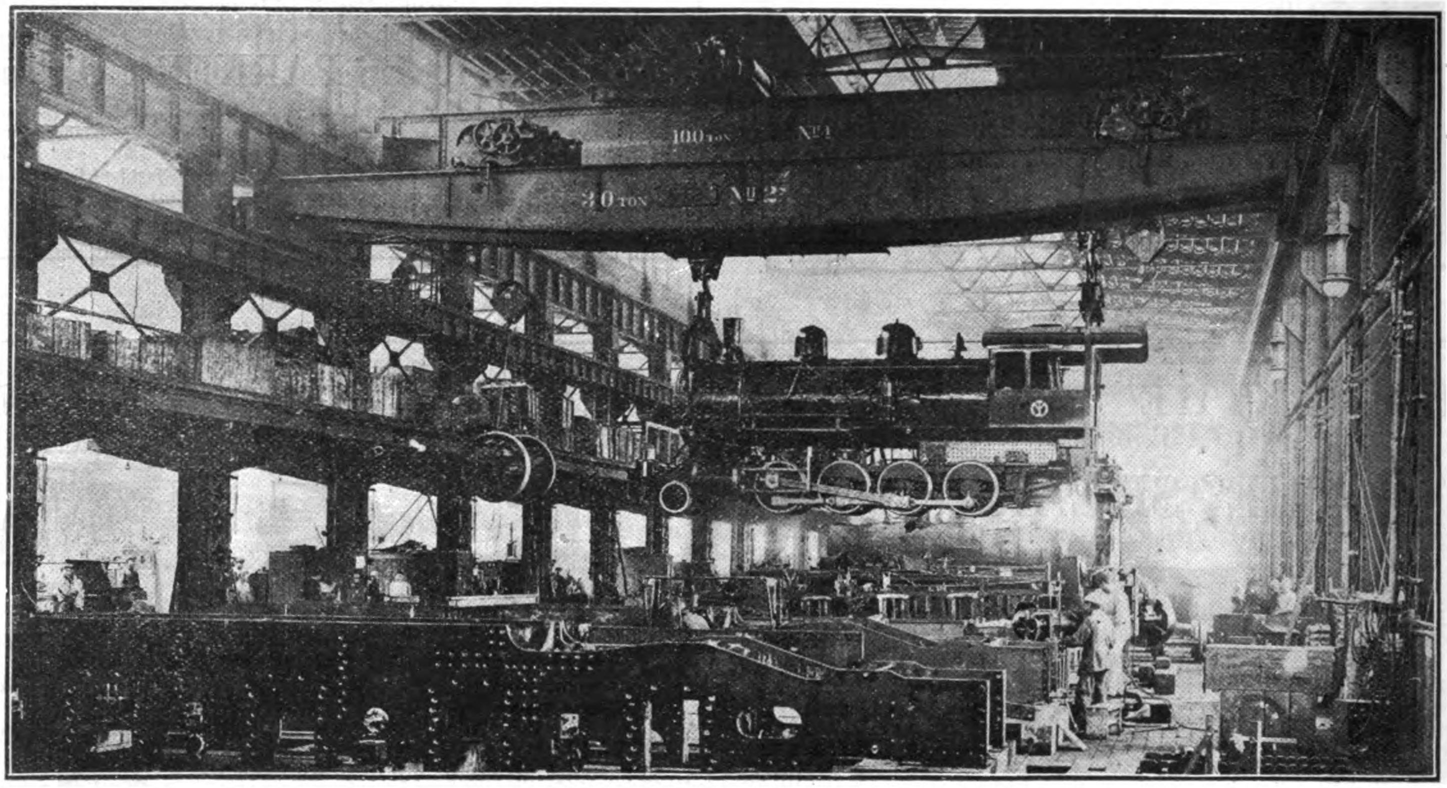
22 JOHN ST., BROOKLYN, N.Y., U.S.A.

Presses, Dies and Machinery for the Sheet Metal Industry in general. Complete plants for the manufacture of Metal Boxes, Sanitary Cans of all shapes and sizes, Kitchen Utensils, Petroleum Cans, etc. Complete automatic equipment for making tin cans from tin plate in one continuous operation.

London, England—Pocock St., Blackfriars Road Paris, France—100 Boulevard Victor Hugo, St. Ouen

SOUTH MANCHURIA RAILWAY

SHAKAKO RAILWAY WORKSHOPS



Interior of Engine Erecting Shop, Shakako Shops, S.M.R.

LARGEST AND MOST COMPLETE IN ALL MANCHURIA AND CHINA

AREA OF LAND: About 300,000 Tsubo. OFFICES & WORKSHOPS, 14,000 Tsubo

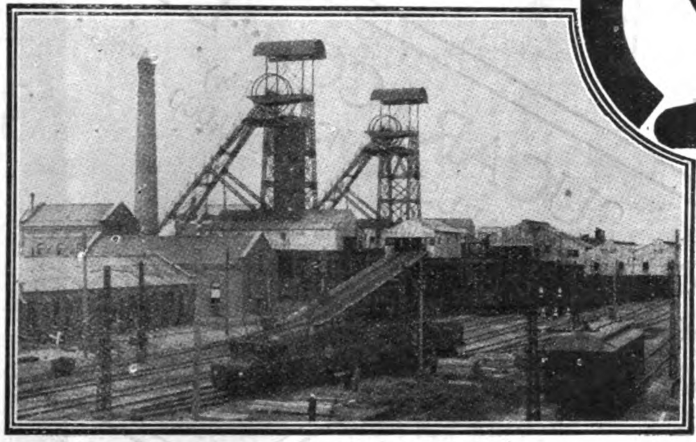
CAPACITY OF EXECUTING REPAIRS SIMULTANEOUSLY:

27 Locomotives, 36 Passenger Cars, and 130 Freight Cars, besides Constructing and Repairing other Railway Materials, Mining Machinery, etc. Employees: 5,000 Japanese and Chinese.

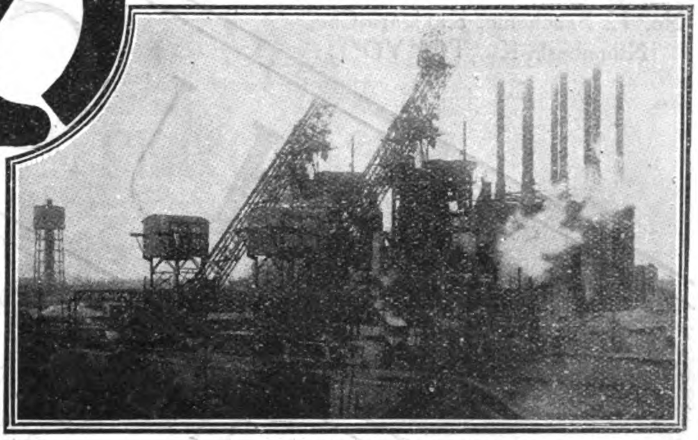
THE EAST IS EAST AND THE WEST IS WEST

SOUTH MANCHURIA RAILWAY

COAL IRON



Togo Pit of the S.M.R. Fushun Collieries



Anshan Steel Works of the S.M.R.

FUSHUN COAL

The Best Steaming Coal in the Far East | Fresh Stocks Always on Hand

Depots:

Dairen	Port Arthur	Newchwang (Yingkou)
Tientsin	Tsingtao	

Agencies:

Chefoo	Takao (Formosa)	Osaka
Manila	Batavia	Nagoya
Hongkong	Yokohama	Shanghai
Sourabaya	South Seas	Moji
Singapore	Niigata	Saigon
Penang		etc.

Also Sulphate of Ammonia, Fire Clay, and Talc

Pamphlets and Particulars gratis from any of the above Depôts and Agencies, and from the

MINING DEPARTMENT,

South Manchuria Railway Company, Dairen

ANZAN IRON & STEEL WORKS

New Enterprise Set Up Like Magic Amidst the Wilderness of Manchuria.

TRACT OF LAND: about 4,000,000 tsubo.

BLAST FURNACE No. 1 (with a capacity for about 350 tons per day) Opened to service on April 29, 1919.

BLAST FURNACE No. 2 (with a capacity for about 350 tons per day) Made ready for service on February 24, 1920.

MEANS OF TRANSPORTATION in the plant: 24 miles of railway and 2.5 miles of electric tramway in operation, with three light locomotives and a number of slag-, coke, and ore-cars of from 8 to 24 tons.

A NEW TOWN SITE of 400,000 tsubo, with the necessary roads and water and sewage services, laid out and rented to lessees.

OFFICIALS AND EMPLOYEES: 2,300 Japanese and Chinese.

BUT THE TWAIN HAS MET AND BLENDED HERE

TRADE MARK S

CABLE ADDRESS: "SUGAR," TOKYO
CODE: A.B.C. 5TH EDITION
Head Office:
No. 12 Sanchome, Kakigara-Cho,
Nihonbashi-Ku, TOKYO

RAW **SUGAR** REFINED

THE JAPAN SUGAR CO., LTD.
(DAI NIPPON SEITO KABUSHIKI KAISHA)
CAPITAL: YEN 18,000,000; PAID-UP: YEN 12,000,000

TRADE MARK S

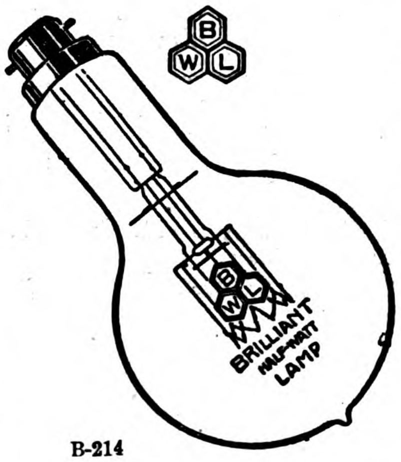
BRILLIANT Half Watt LAMPS

give MORE LIGHT, BETTER LIGHT
at LESS COST than any vacuum lamp.

Call at our Show Room Nanking corner
Honan Roads and we'll convince you.

THE BRILLIANT ELECTRIC CO.

Dependable Suppliers of Everything Electrical.



博利安半華德電泡
加倍光明減半電費

博利安電料公司
上海英大馬路拋球場
電話中央四九〇七

B-214

Smoke! Smoke!! Smoke!!!

The "Tas Hee" & "Szy Hee"
brands of cigarettes.

They are not to be surpassed in excellence, selected from the most superior tobaccos, they will be found pleasing smokes by all. Connoisseurs agree that they are not to be excelled for their fragrance

Try them and you will like them.
Obtainable at very moderate prices from most stores and stalls.

Manufactured by the
Canton Nanyang Brothers
Tobacco Co., Ltd.,
10 Dent Road

Head Office:
12 Nanking Road

中國南洋兄弟烟草有限公司啟

A NEW FEATURE

THE FAR EASTERN REVIEW

WEEKLY ENGINEERING SUPPLEMENT

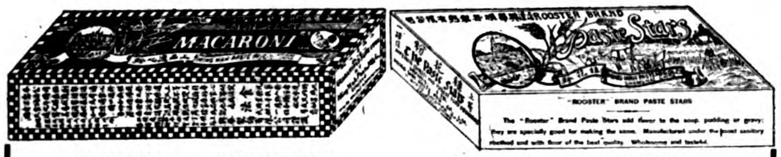
Information on Business Opportunities

EXISTING ENTERPRISES

RAILWAY CONSTRUCTION

ENGINEERING PROSPECTS

MINING DEVELOPMENTS



Cable Address: "HINGWAH" Code used: A.B.C. 5th Edition

香港上海興華機器製麵有限公司

The Hing Wah Paste Manufacturing Co. Ld.

Macaroni, Paste Stars, Egg Noodles,
Vermicelli, and all kinds of Soup Stuffs

All our Pastes bear the "ROOSTER" label and are made with Flour of the Best Quality containing a large percentage of Gluten, and are manufactured under the most sanitary conditions. Having been analyzed by the Government Analyst of Hongkong, our productions have been found to be free from adulterations and from any injurious ingredients.

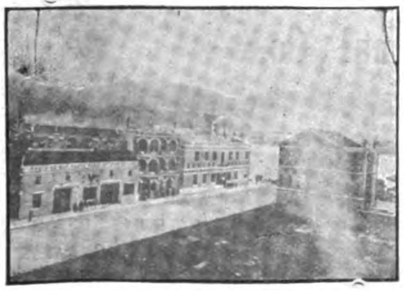
Large quantities have been exported to various parts in the World.

Your esteemed orders will receive our prompt and careful attention.

Terms moderate, especially for Agencies.

Head Office: Hongkong, Nos. 47-48 Connaught Road Central Tel. No. 2230

Branch Office: Shanghai Nos. 430-431 Nanking Road



Factories: Hongkong Wing Hing Street Causeway Bay and Shanghai No. 71 North Soochow Road

AWARDED GRAND PRIZE OF HONOUR
PANAMA PACIFIC EXHIBITION, SAN FRANCISCO, 1915.
MOST POPULAR **BEER** IN THE ORIENT

ASAHI YEBISU SAPPORO

BREWED BY

THE DAI NIPPON BREWERY CO., LTD.

HEAD OFFICE: TOKYO

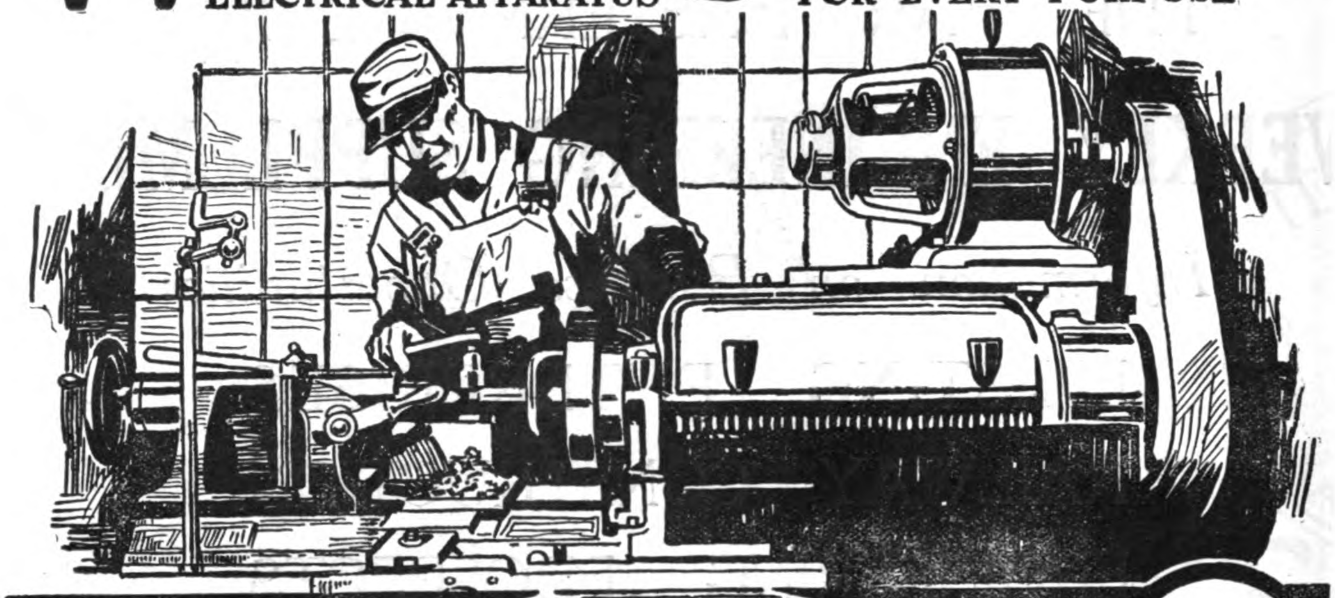
BRANCHES OSAKA, SAPPORO, SEOUL, SHANGHAI, TSINGTAO.

SOLD EVERYWHERE

Agents: MITSUI BUSSAN KAISHA,
China, Straits Settlements, Dutch East Indies, and British India

Westinghouse

ELECTRICAL APPARATUS FOR EVERY PURPOSE



This trade mark is the guarantee of dependable electrical equipment.

Power

Man's ability to use Nature's power measures the progress of the human race. What tremendous advances the last century has disclosed!

Discovery after discovery; invention after invention perfected—until now, a fitting climax, the titanic force of electricity responds to the pressure of man's finger.

For as late as 1840 power was still furnished by hand; in 1860 a treadmill was invented, a horse furnishing the power; in 1875 a vertical steam plant on top of a boiler; in 1905 the horizontal engine and to-day, the acme of perfection, the induction motor directly connected with the machine without loss of power—the product of Westinghouse Electric.

And always to the forefront, in the march of electrical progress has been the great Westinghouse organization. Founded in 1886, it has ever proven worthy. To-day it employs more than 40,000 workmen, the most skilful engineers and scientists. In 21 great factories it makes electrical equipment of all kinds. Its products reach wherever there is electrical power in the world.

Westinghouse Electric International Co.

165 Broadway, New York City, U. S. A.

Cable:

Wemcoexpo, New York 11

This space will show monthly a new aspect of one of the great industrial institutions of the world.

Sole Agents in China: GASTON, WILLIAMS & WIGMORE, E. E. CORPN.

22 Kiukiang Road, SHANGHAI 31 Rue de L'Amiraute, TIENTSIN

Agents in Japan: TAKATA & CO., Tokyo

TEXACO
REG. TRADE MARK

There is a Texaco Lubricant for Every Purpose

NO matter what condition of speed or temperature has to be coped with, *there is a Texaco lubricant for every purpose.*

We maintain a staff of engineers who are competent to survey your machinery for you and advise you what kind of lubricants to use in order to get the utmost in work from your plant at the least possible cost in frictional wear and tear. If you have any lubrication problems—and every engineer has them once in a while—talk to our engineers about the matter. They are fully competent to advise you. They will be glad to examine your machinery and prescribe the right kind of oil.

Meantime, write for our monthly magazine, "Lubrication," devoted to the scientific selection and use of lubricants. It costs you nothing.

General Offices:

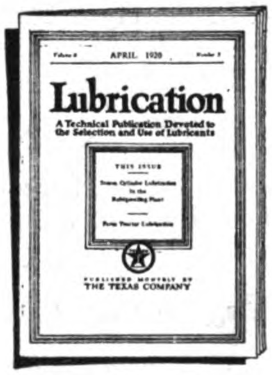
THE TEXAS COMPANY,

DEPARTMENT "K"

128 SZECHUEN ROAD, SHANGHAI

Branches:

Hongkong	Canton	Hankow	Wuhu	Chinkiang
Tientsin	Dairen	Mukden	Chemulpo	



TEXACO

DXN TRADE MARK

Backed by Real Experience

Woven into the walls of DIXON CRUCIBLES are ninety-three years of successful crucible making.

Ever since 1827, when Joseph Dixon made the first successful "black-lead" crucible, this experience has accumulated until now it is a wonderful wealth of knowledge.

DIXON CRUCIBLES have, during these many years, maintained a standard of efficiency and quality that has made them the first choice of discriminating foundrymen, and to-day they are made with the same care and skill which won this unequalled reputation, plus the knowledge gained in nearly a century of experience.

DXN TRADE MARK

For Prices, Information, etc., communicate with

HENRY KATTEN

WALWORTH INTERNATIONAL CO.

22 Kiukiang Road Shanghai, China

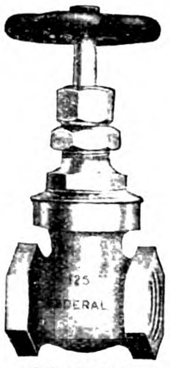


FIG. W2471
FEDERAL BRASS
GATE VALVE

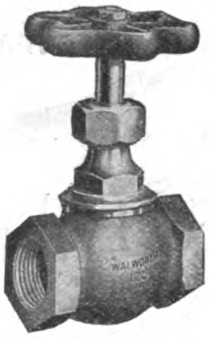


FIG. W3041
STANDARD BRASS
GLOBE VALVE

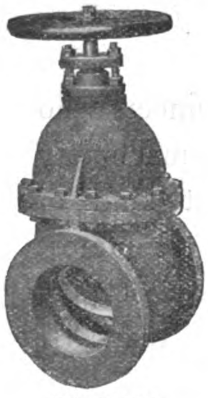


FIG. W2622
STANDARD
IRON BODY
GATE VALVE

Some Walworth Leaders

The complete line of Walworth Brass and Iron Bodied Valves cannot even be indicated in a single advertisement.

We have therefore shown some leaders of this great line and say with pardonable pride that they are the result of our ceaseless endeavor, for over three-quarters of a century, to bring them to that high quality that the best material, the newest methods and the most skilled workmen alone can produce.

Besides a large number of special valves, the line extends from lighter valves for lower pressures to valves that meet modern requirements of high pressures and temperatures.

WALWORTH MANUFACTURING COMPANY

Oldest continuous manufacturers in the United States (since 1842) of a complete line of Valves, Fittings and Tools for steam, water, oil, gas, and air. Originators of the Famous "GENUINE WALWORTH STILLSON" Wrench and the "KEWANEE" Union.

Export Sales Agents:

WALWORTH INTERNATIONAL COMPANY

New York City, U. S. A.

Foreign Sales Offices in All Principal Cities

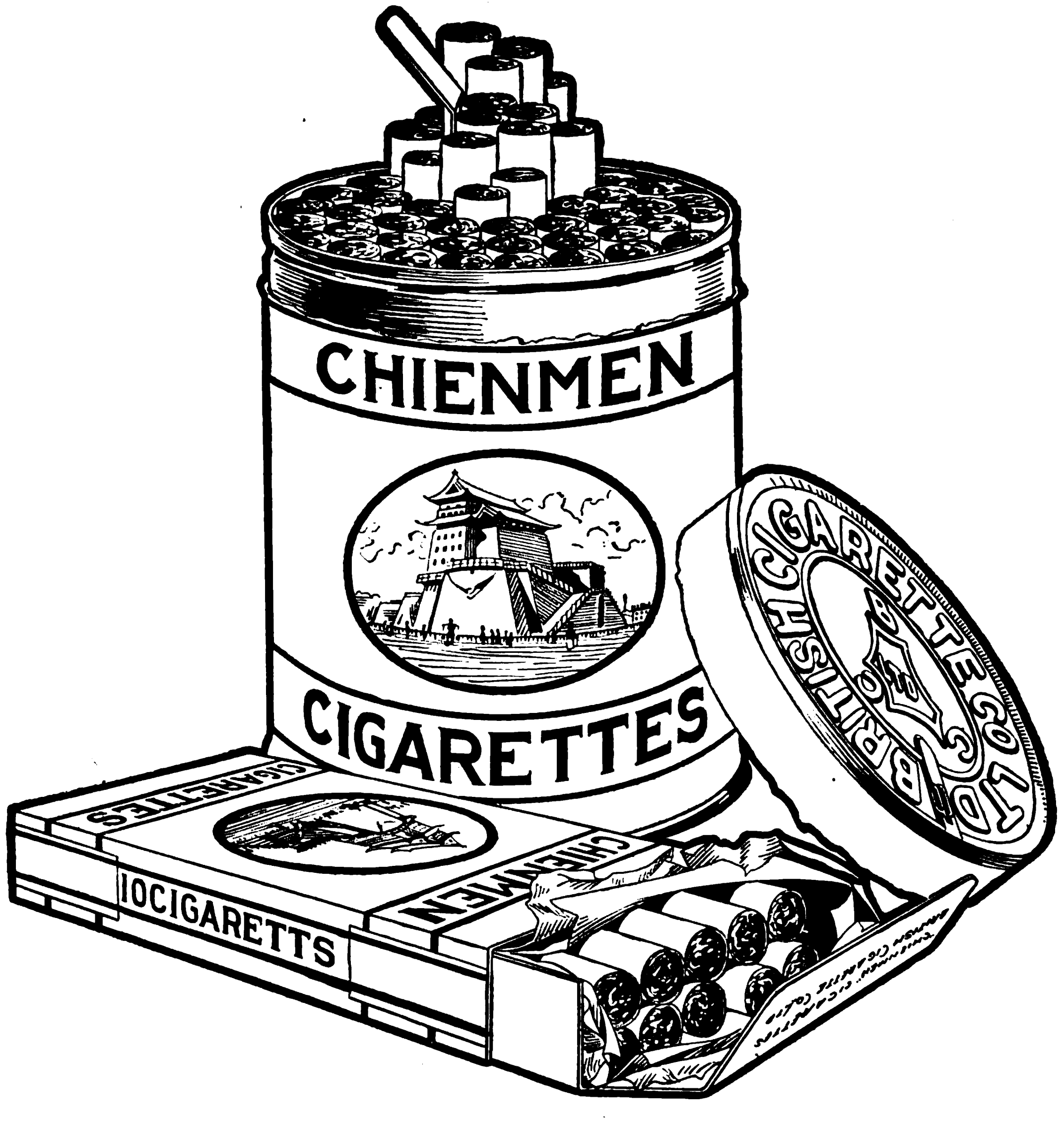
For catalog, prices or information, address

HENRY KATTEN

22 Kiukiang Road Shanghai, China

CHIENMEN

Cigarettes



A brand well known to the "High Grade Cigarette Smoking Public" of China.

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THE FAR EASTERN REVIEW

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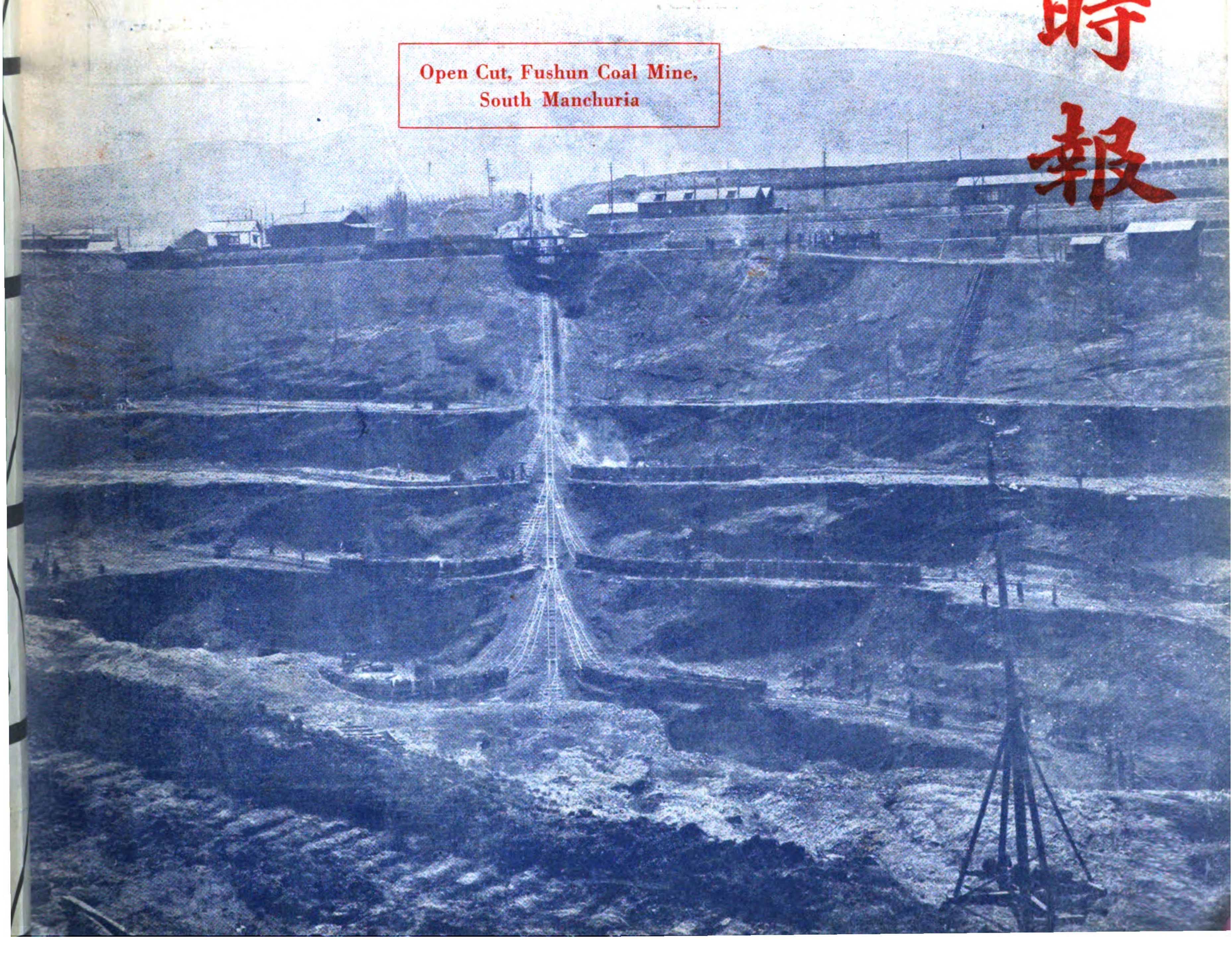
MINERAL WEALTH OF TONKIN

PETROLEUM IN THE NETHERLANDS EAST-INDIES



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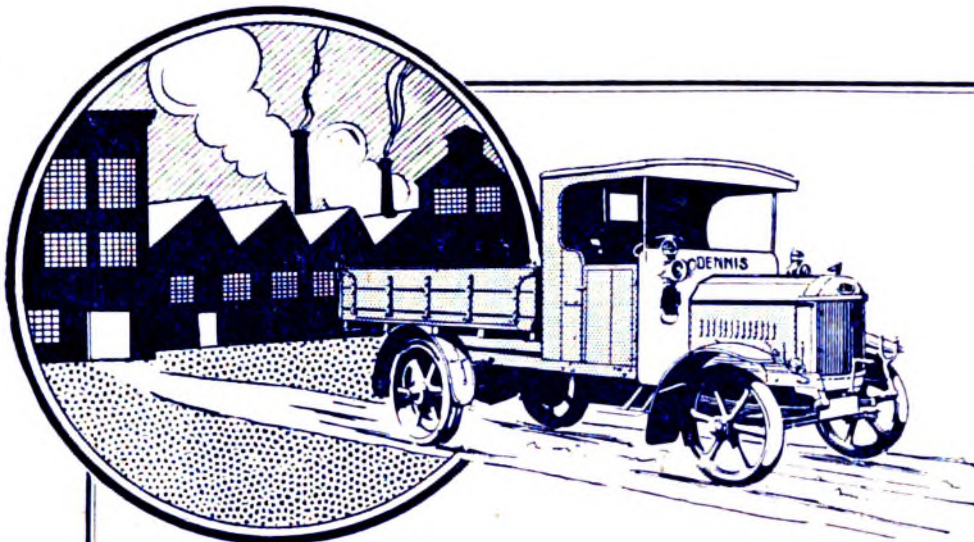

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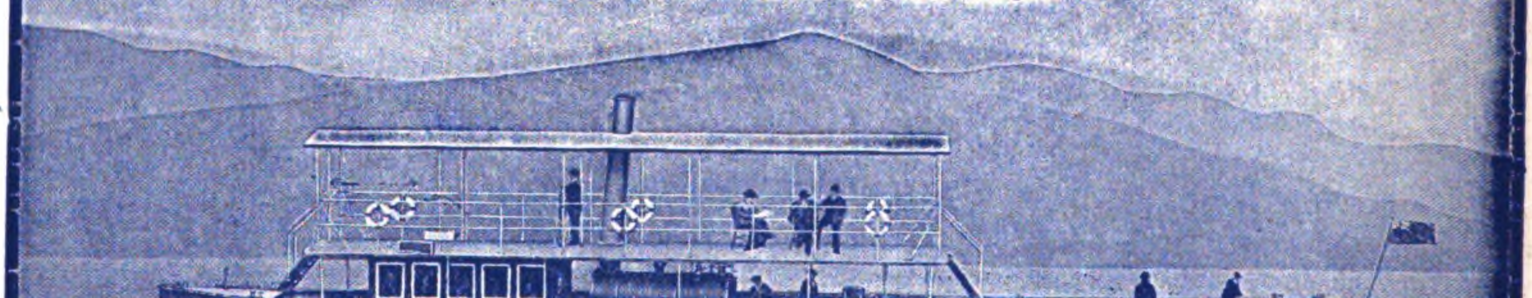

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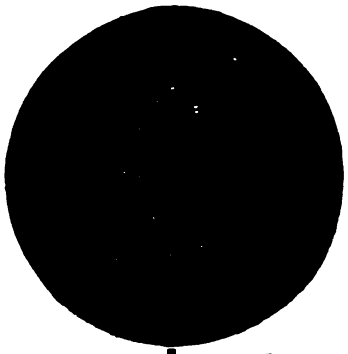

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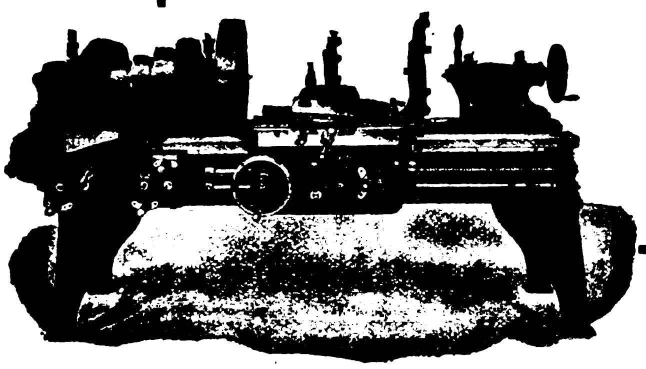

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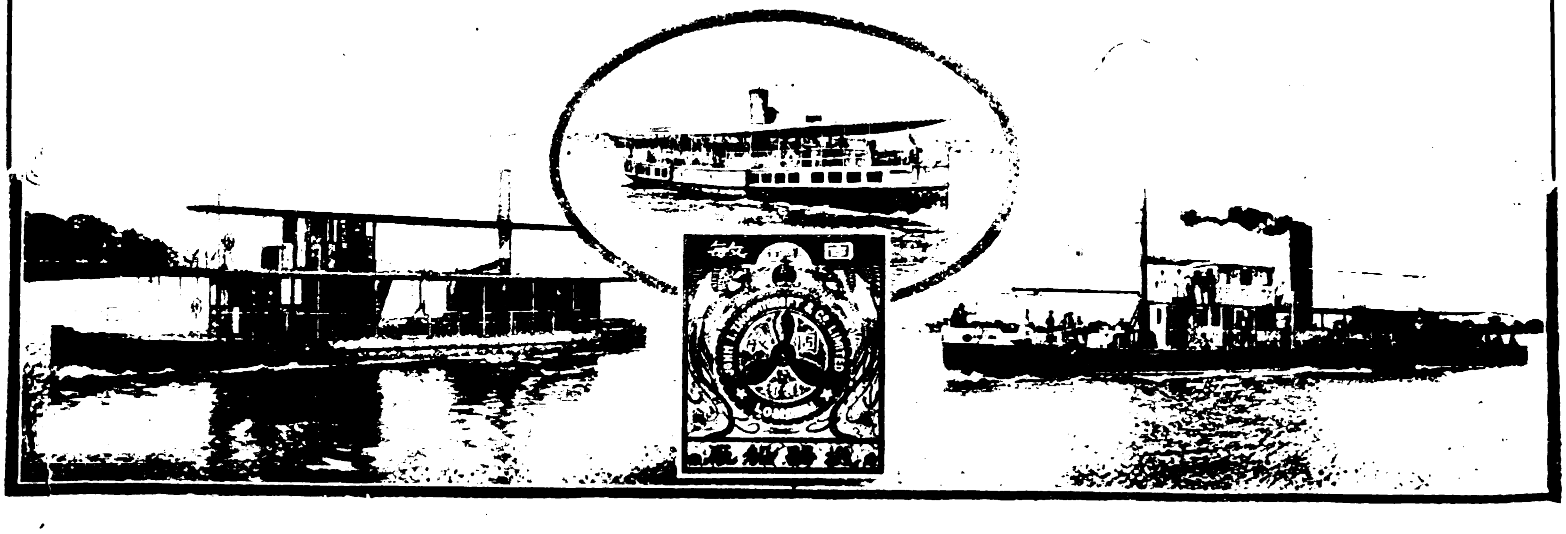

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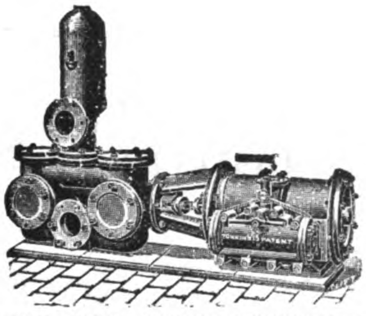

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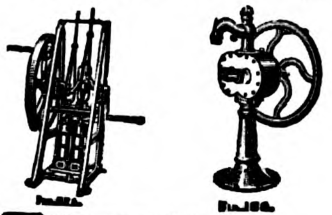

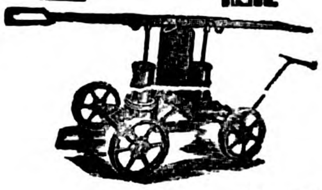

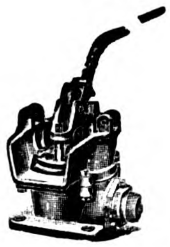

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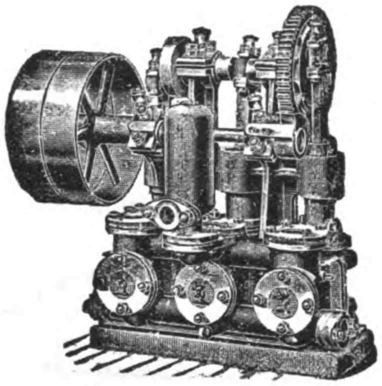

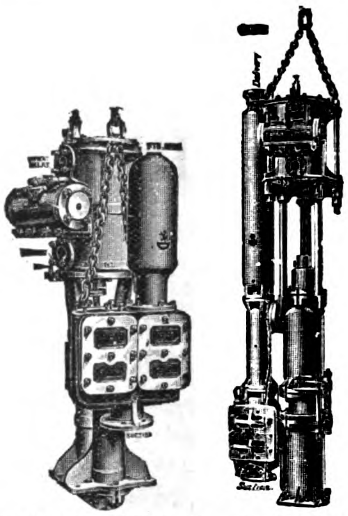

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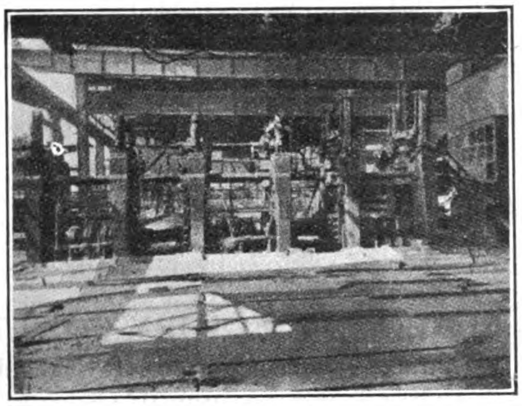

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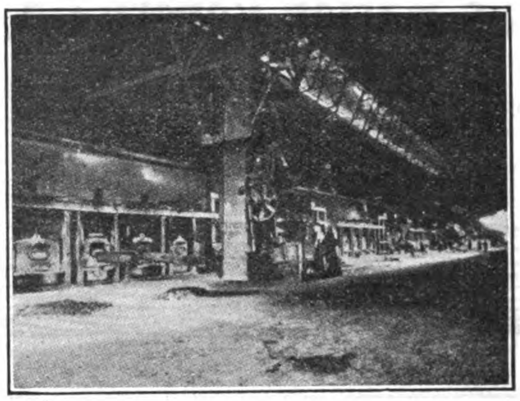

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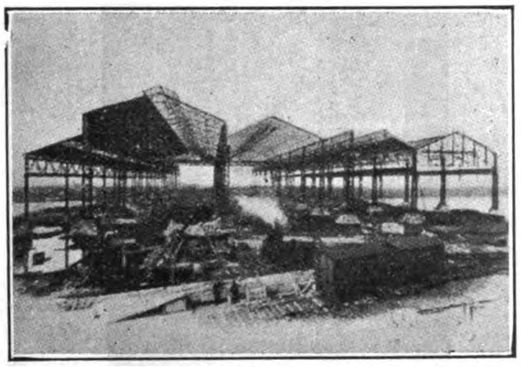

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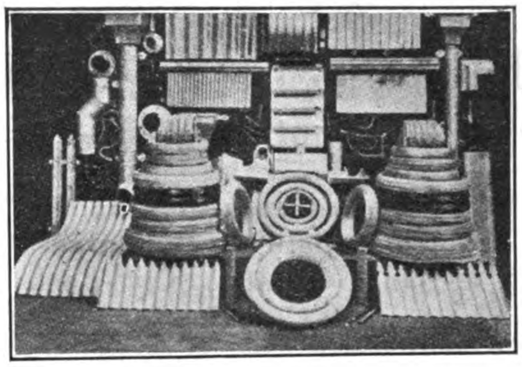

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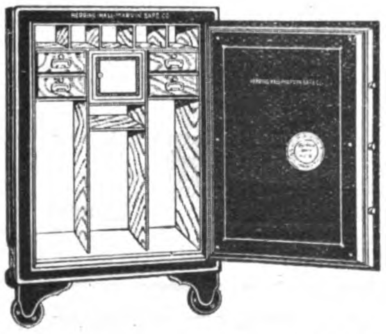

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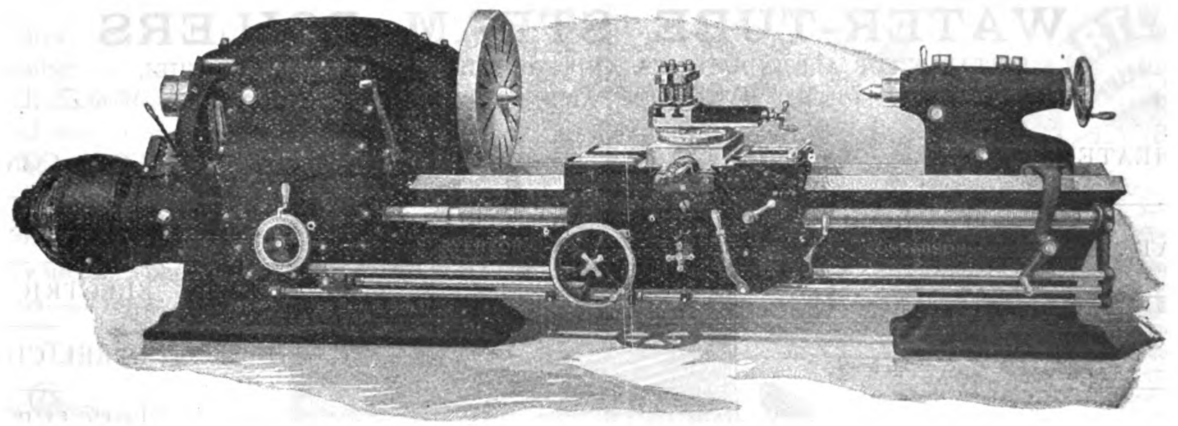

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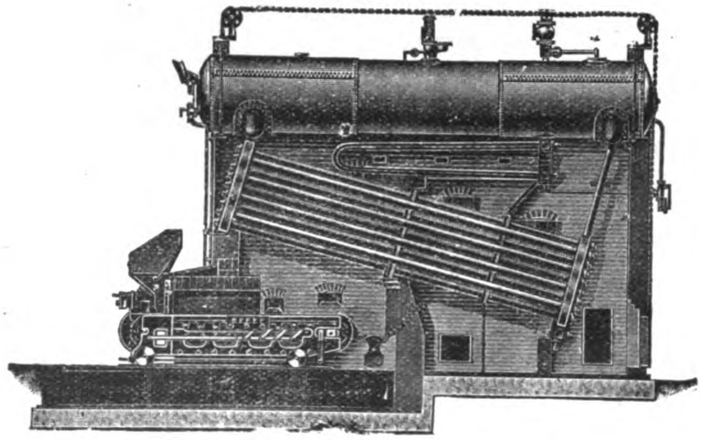

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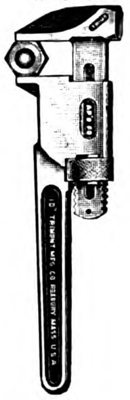

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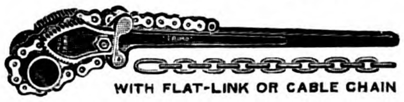

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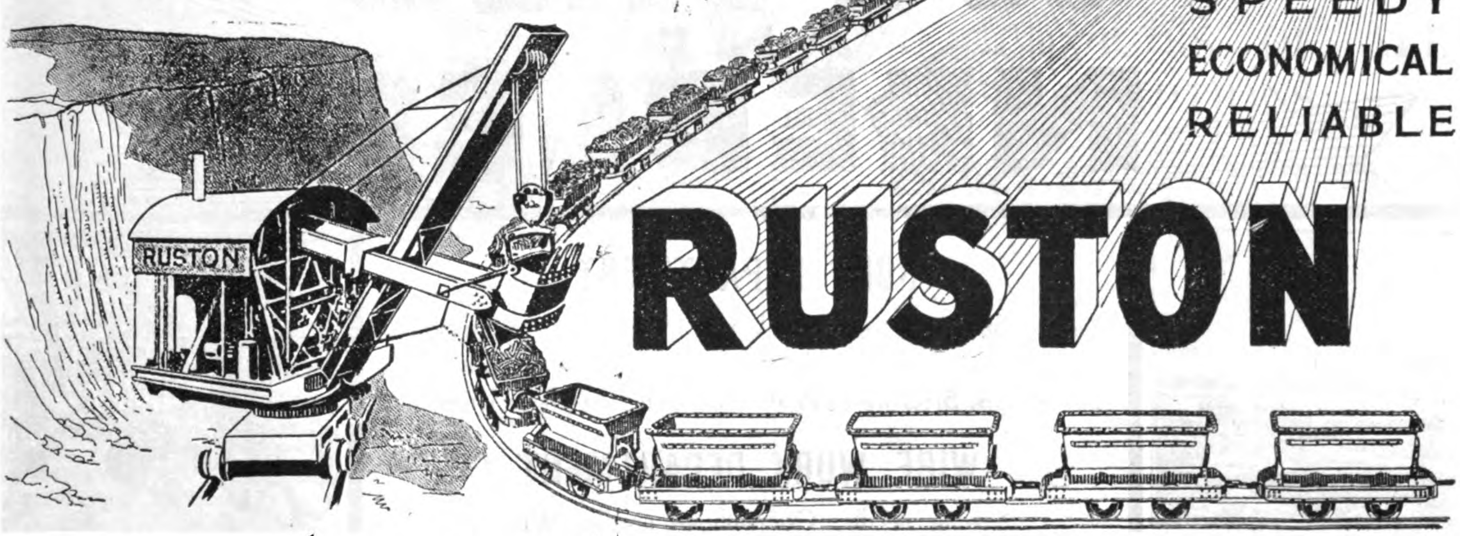

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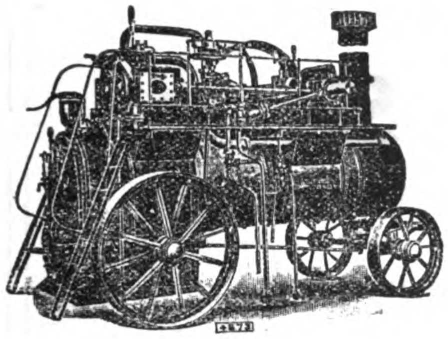

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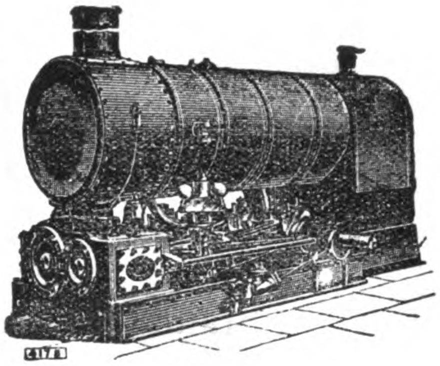

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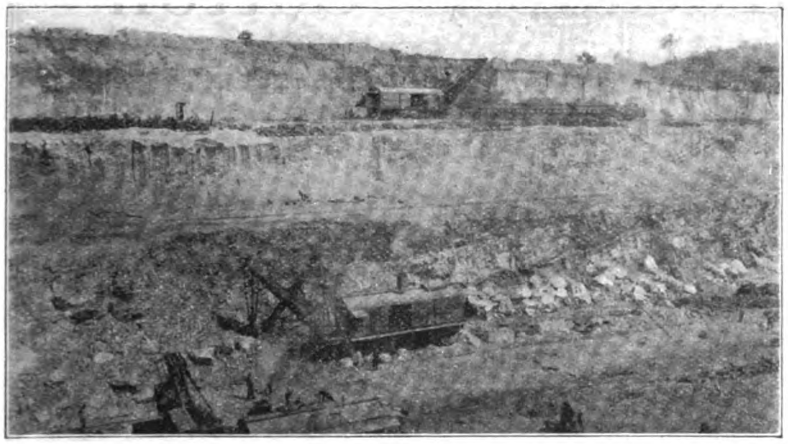

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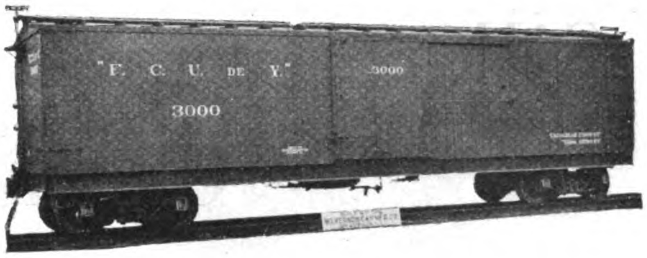

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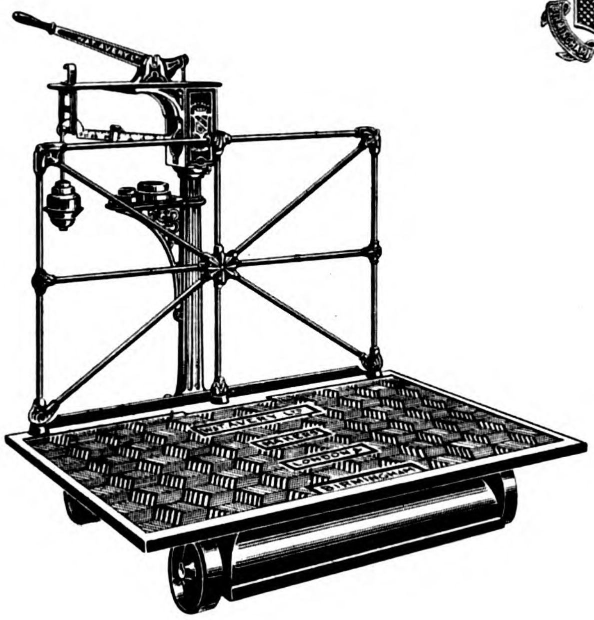

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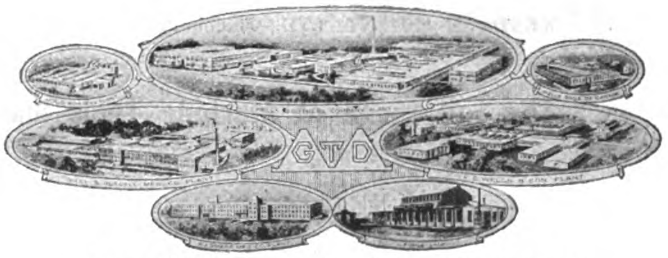

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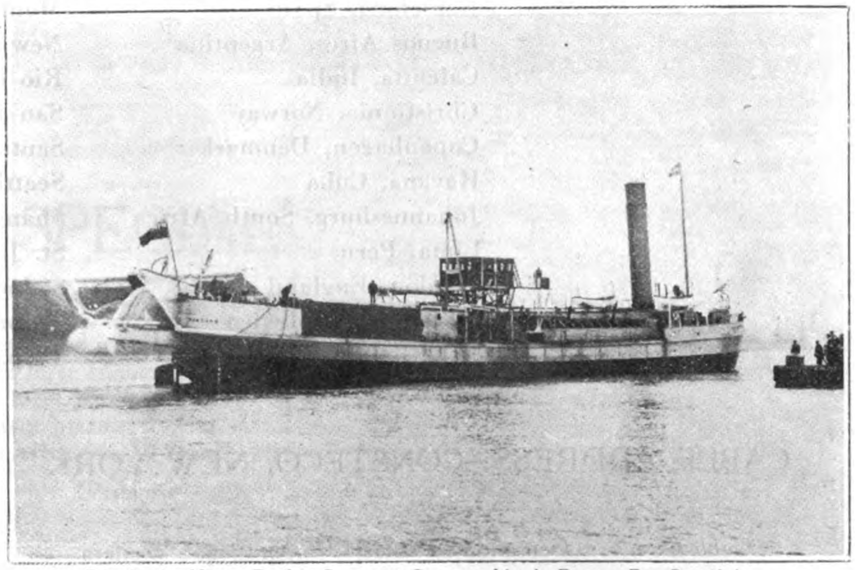

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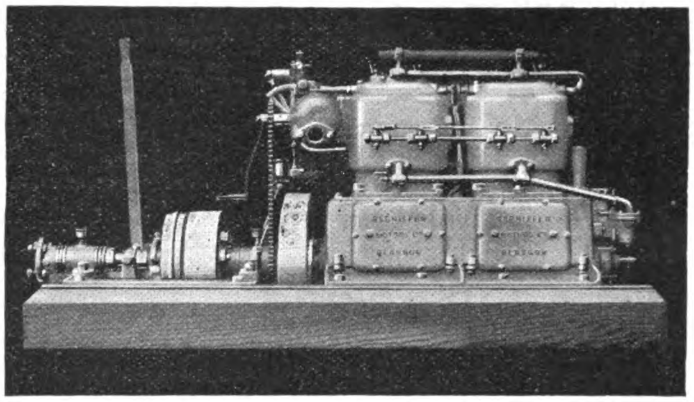

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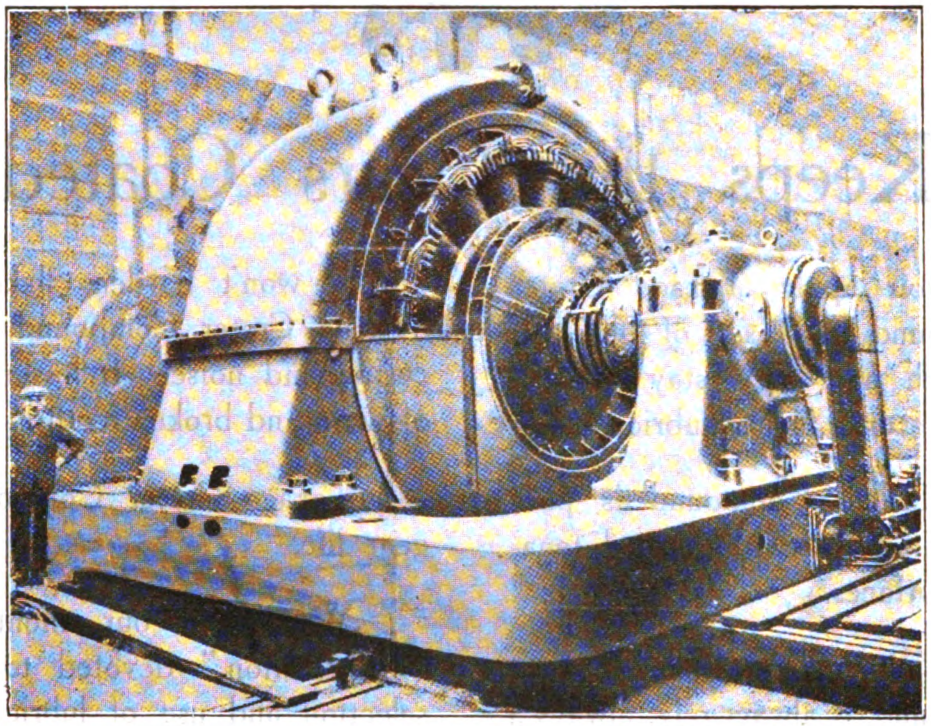

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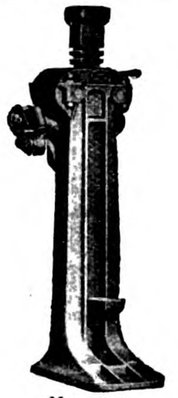

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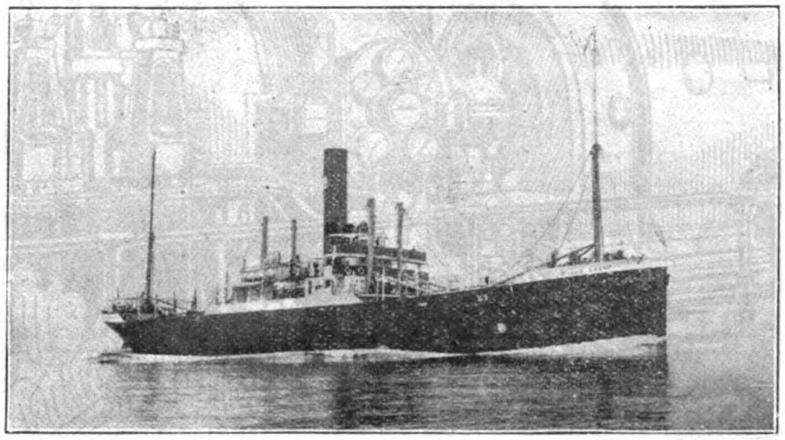

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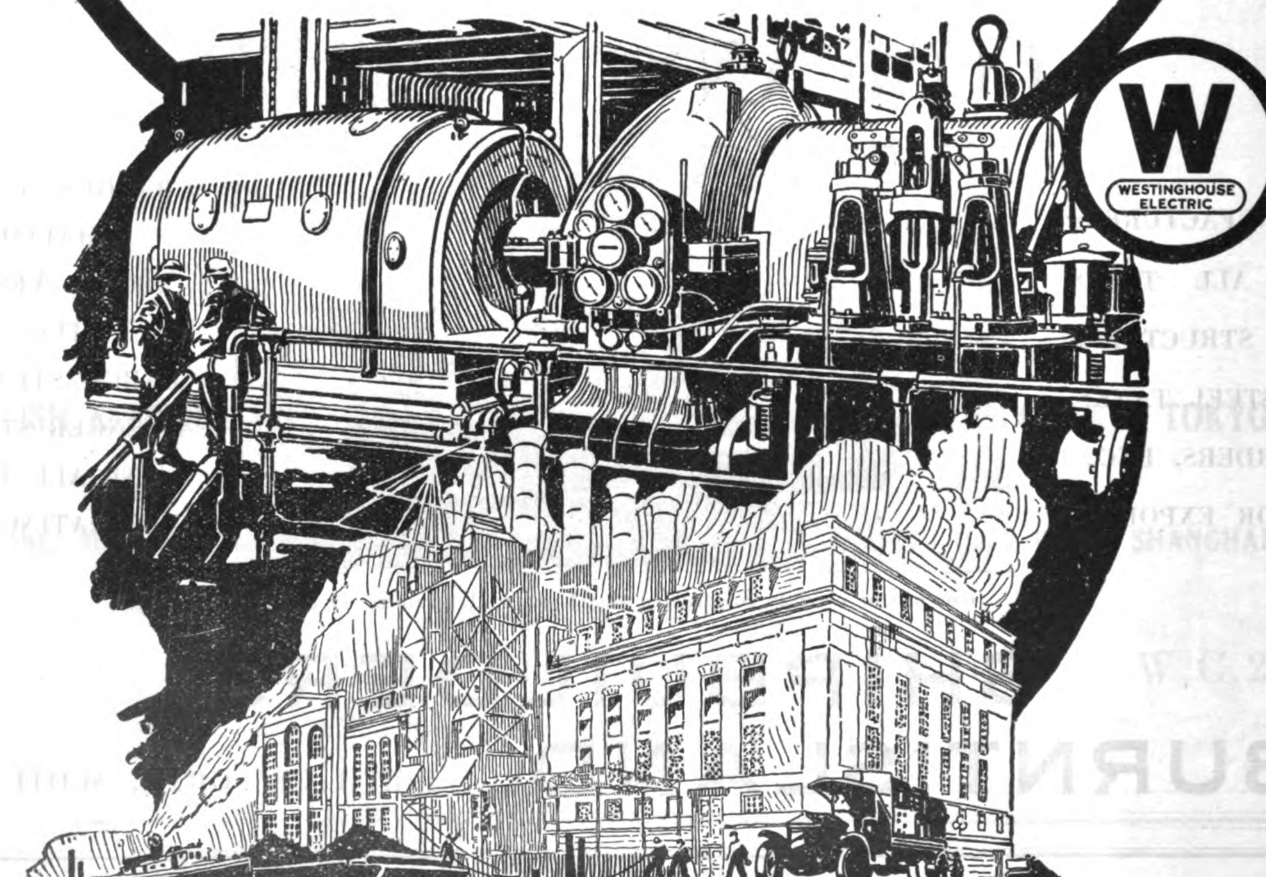

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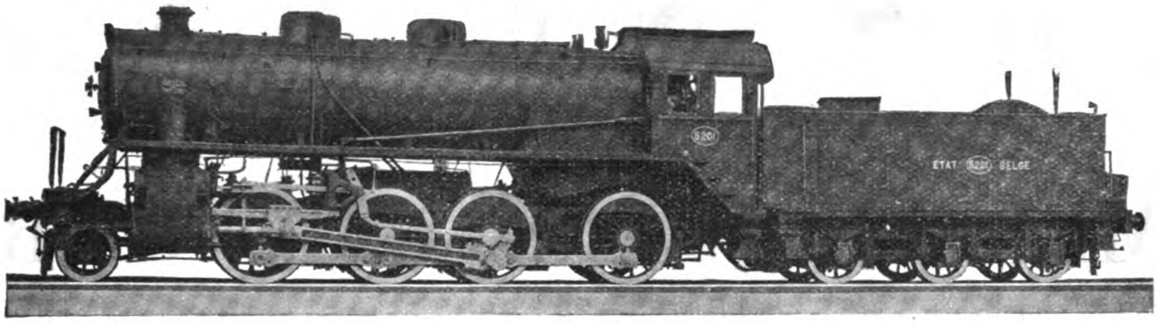

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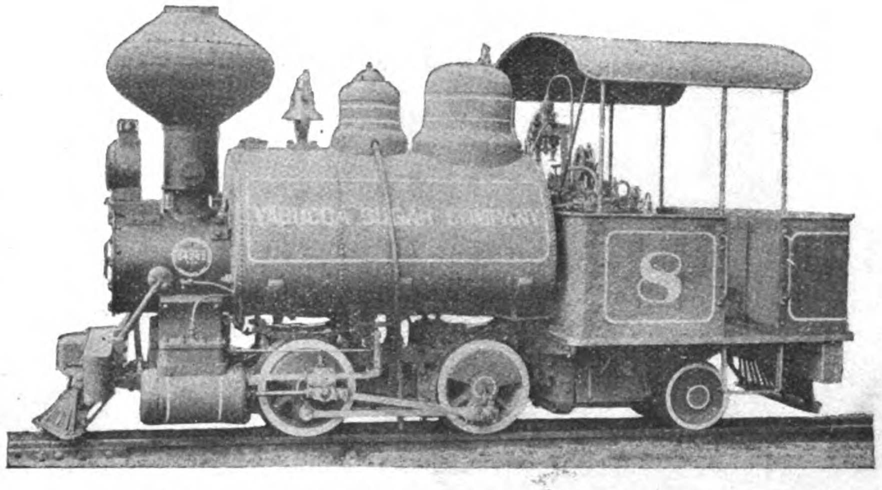

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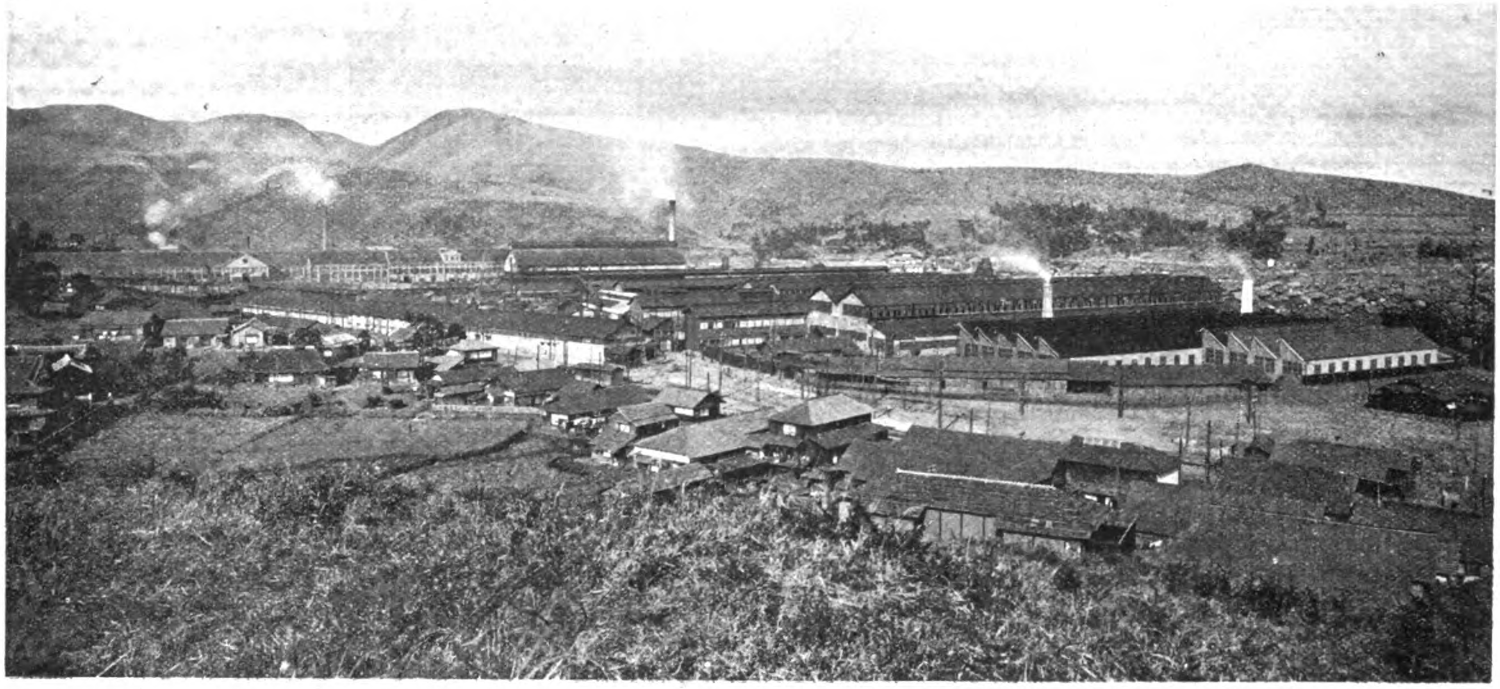

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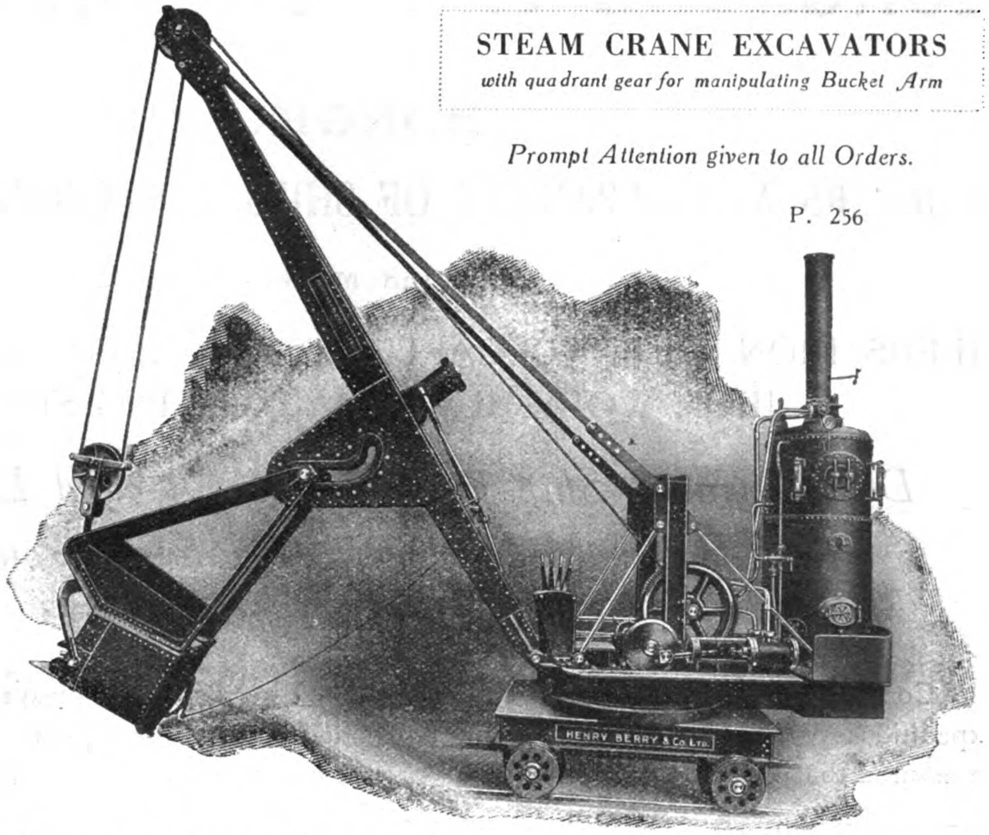

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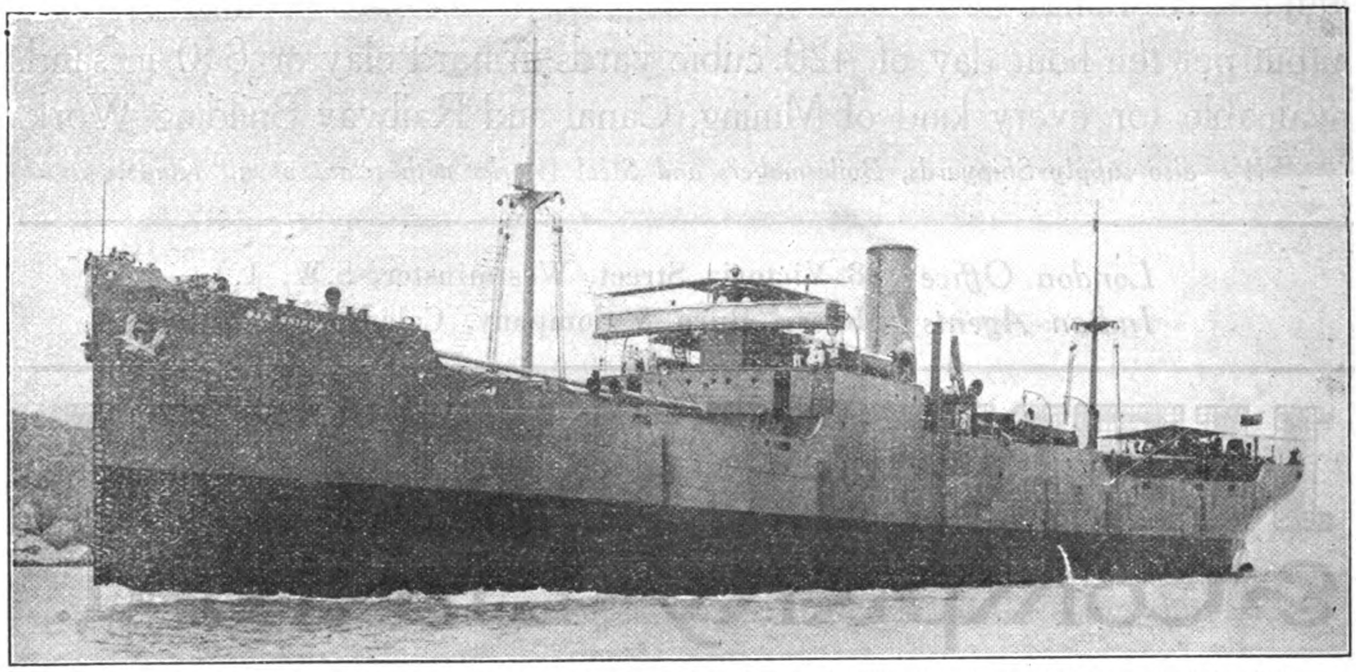

S.S. "*WAR SNIPER*," 8,200 tons d.w.—5,175 tons gross. Built and engined by The Hongkong & Whampoa Dock Co., Ltd. to the order of the British Government.

Address Enquiries to the Chief Manager, R. M. DYER, B.Sc., M.I.N.A., Kowloon Docks, Hongkong

HEAD OFFICE: KOWLOON
TELEPHONE No. 55 K.

TOWN OFFICE: QUEEN'S BUILDINGS
TELEPHONE No. 20 HONGKONG

TELEGRAPHIC ADDRESS: "MANIFESTO" HONGKONG

Codes Used: A1; A.B.C., Fifth Edition; Engineering, First and Second Editions; Western Union and Watkins

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With Steel Plate or Cast Iron Frames

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The Anglo-Chinese Engineers' Association, Ltd.

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7 Hankow Rd., Shanghai

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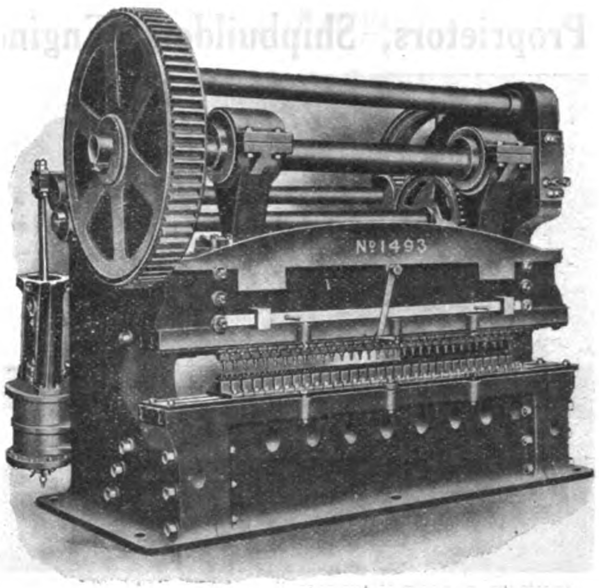

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Steam Bending and Straightening Machines.

Bar Cropping Machines.

Multiple Punching Machines.

etc. etc.

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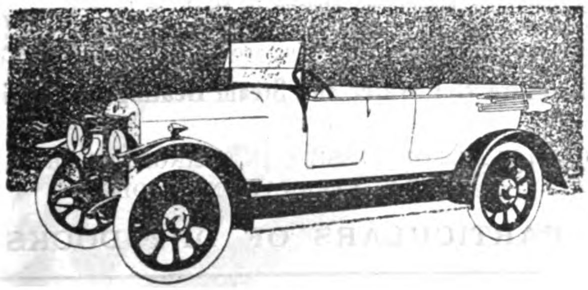
Johnstone, Nr. Glasgow, Scotland



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EVERY PART IN THE 15·9 h.p. Arrol-Johnston car chassis is standardised to Aircraft Gauges. Every bar and ingot of material passes stringent laboratory and physical tests.

The equipment includes 815 × 105 m.m. Dunlop Tyres, C.A.V. Lighting and Starting Set, Spare and Tyre, Disc Wheels, Adjustable Seats, &c. The specification covers 4-cyl. Engine with special cooling, 4-speed Gearbox, spiral drive Back Axle, and a 9-in. ground clearance.

Of all high-grade British cars it is the lowest in price, and, though its Home popularity is such that it is entirely unaffected by the British "car slump," a certain proportion of the output is devoted to Eastern markets in order to foster future demands.

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SHANGHAI : The Shanghai Motor Co., Ltd., 36, Bubblingwell Rd.

SINGAPORE : The Central Engine Works, Ltd.

The Shanghai Dock and Engineering Co., Ltd.

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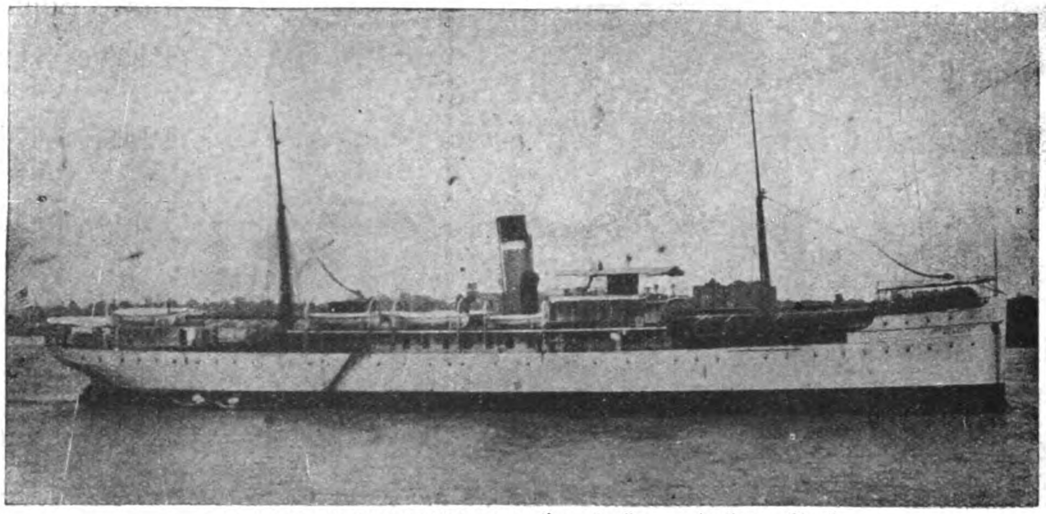

U.S. ARMY TRANSPORT "MERRITT," 300′ 0″ × 45′ 0″ × 28′ 3″

Cable Address "FARNHAM" Codes Used, A.B.C. 4th, 5th & 6th Editions A-1, Watkin's, Scott's, Western Union, Bentley's and Engineering.

The "Merritt" is one of Twenty-Seven Steam Vessels built during the last few years to the order of The American Government for service in the Philippine Islands.

The Docks are five in number, ranging in length from 355 feet to 532 feet on the Blocks, and breadth of entrance from 53 feet to 77 feet, with a depth of water on the sill of from 16 feet to 24 feet.

The Dock charges are the most moderate in the Far East.

The Company's Yards and Docks cover 96 acres. The Water Frontage is about 1½ miles in length. Wharves and Pontoons are arranged where steamers can moor during repairs; and slips for hauling up small vessels are provided. Sheer legs capable of lifting 65 tons are placed at the various Docks.

The extensive Shipbuilding yards and workshops, lit by Electric Light, are provided with the latest improvements, such as travelling cranes of 60 tons' capacity, hydraulic and pneumatic machinery and tools.

Light railway lines are laid throughout workshops and yards.

A Staff of Divers, and powerful salvage appliances, and Floating Cranes ready for any emergency at short notice. Enquiries immediately attended to.

Estimates given for all classes of work: Coast Steamers, Side and Stern Wheelers, Tugboats, Launches, Steam Barges, Dredgers, Floating Cranes, and Lighters a speciality.

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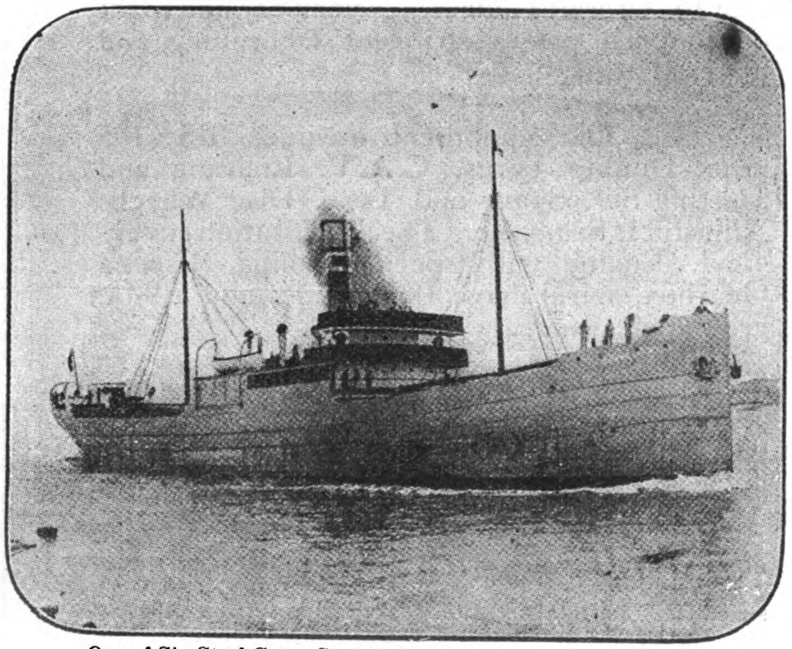

One of Six Steel Cargo Steamers presently under construction.

CALL FLAG FOR VESSELS IN SHANGHAI HARBOUR "F.B." INTERNATIONAL CODE

PARTICULARS OF DRY DOCKS

Names	Length on Blocks	High Water	
		Breadth of Entrance	Depth of water on Sill
Cosmopolitan Dock	532 feet	77 feet	24 feet
International Dock	528 ,,	77 ,,	23 ,,
New Dock	450 ,,	74 ,,	21 ,,
Old Dock	399 ,,	53 ,,	16 ,,
Tunkadoo Dock	350 ,,	67 ,,	16 ,,

Berths for Building Steamers up to 10,000 tons Deadweight Capacity.

Representatives and workmen attend vessels at Woosung and outports on request.

☛ Telegraphic and Wireless Instructions from vessels promptly attended to

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Their Heads, drop-forged from a special grade of tough steel carefully hardened and tempered, neither crack, chip nor splinter.

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The weight and length of each tool are properly proportioned to give perfect balance and, hence, increased striking power.

All sizes and patterns. Catalogue on request

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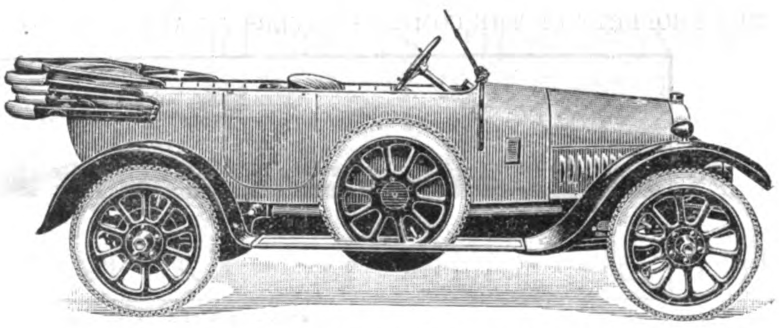
MANY years of close scientific research have been devoted to making the Humber Car a perfect specimen of engine-efficiency and luxurious bodywork. It possesses qualities of speed and comfort hitherto reserved for much higher-priced cars, whilst its economical upkeep and low running costs come as a revelation to even the most experienced car-owners.

The riding comfort provided by its luxurious upholstery in first selection hand buffed leather with real horsehair stuffing and coppered springs—its high-grade bodywork—and grace of contour give to it the Hall mark of distinction.

Write for full particulars of this and other models



Improved 10 h.p. 4-Seater (R.A.C. Rating, 11-4 h.p.)

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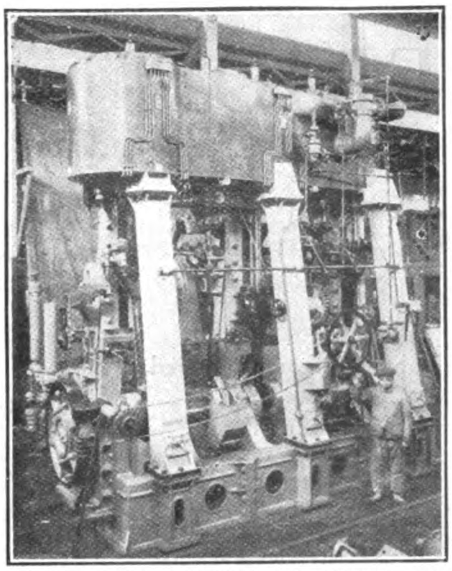

Set of Triple Expansion Engines for Cargo Steamer

THE NEW ENGINEERING & SHIPBUILDING WORKS LTD.

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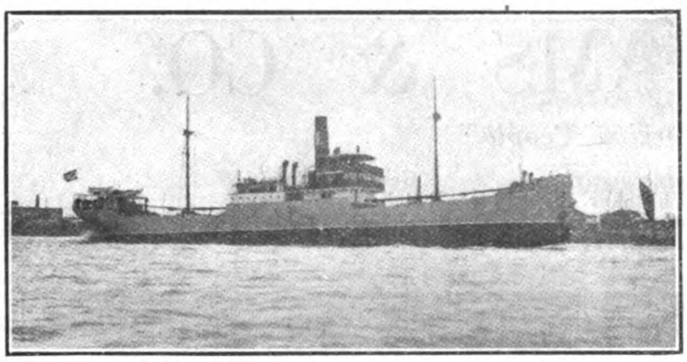
CYLINDRICAL MULTITUBULAR BOILERS, CORNISH and LANCASHIRE BOILERS, VERTICAL BOILERS.



S.S. "Halvdan," one of 8 Steamers Built and Engined at Works

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Ocean and River Craft Oil Carriers

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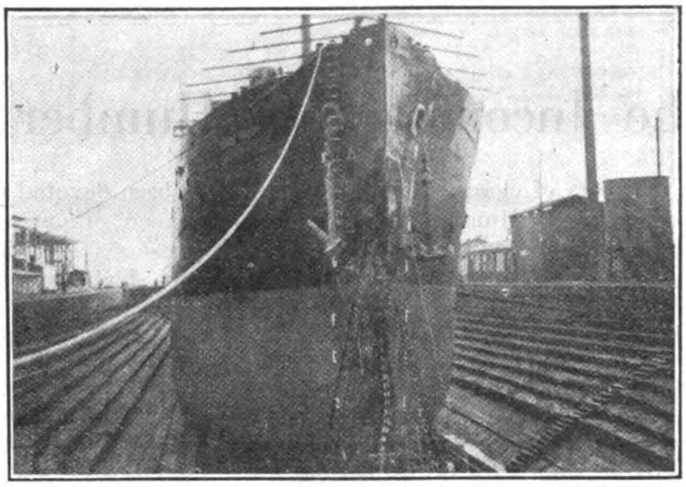
Steam or Motor Driven

Steel, Wood or Composite built.



7,000-ton Steamer Docked for Repairs of Damage Sustained in Collision

DOCK PROPRIETORS

Yangtszepoo Dock

Length	577′-0″
Entrance	70′-0″
Width of Sill	60′-0″
Depth on Sill	20′-0″

Patent Slips

for vessels up to 200-ft. long

Vessels docked promptly

General Repairs, Annual Overhauls and Re-classification Work executed efficiently and expeditiously under European Supervision.

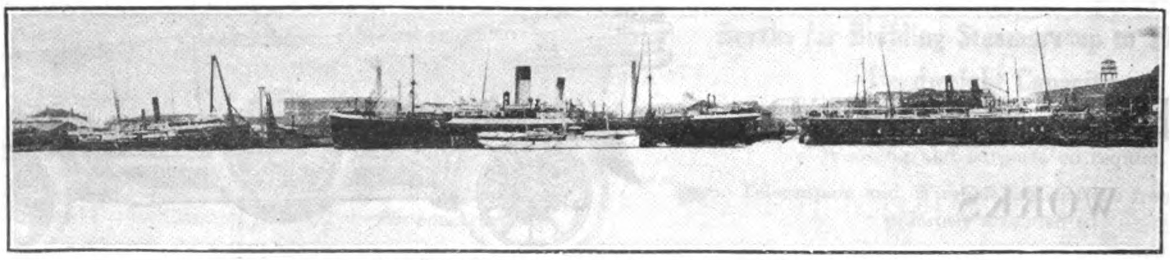
Moderate Charges

Vessels undergoing repairs accommodated at wharves alongside Works.

The Works are equipped with the latest Machine Tools, Electric Drills, Pneumatic and Hydraulic Plant and Tools, Quasi-Arc Electric Welding and Oxy-Acetylene Welding, Galvanizing Plant.

Salvage Experts, Divers and a comprehensive Salvage Plant. Floating Cranes to lift 50 tons and Sheerlegs to lift 80 tons.

THE PROPERTY OF THE COMPANY COVERS AN AREA OF ABOUT 40 ACRES with a RIVER FRONTAGE of 1,800-ft.



General View of Works from River Side

Showing 8 Steamers Berthed Alongside Undergoing Repairs.

Cable Address :
"DOCKYARD" KOBE
"DOCK" DAIREN

A1, A.B.C. (4th and 5th),
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Bentley's
and
Western Union Codes Used

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CONTRACTORS TO THE IMPERIAL JAPANESE ARMY AND NAVY AND TO FOREIGN GOVERNMENTS

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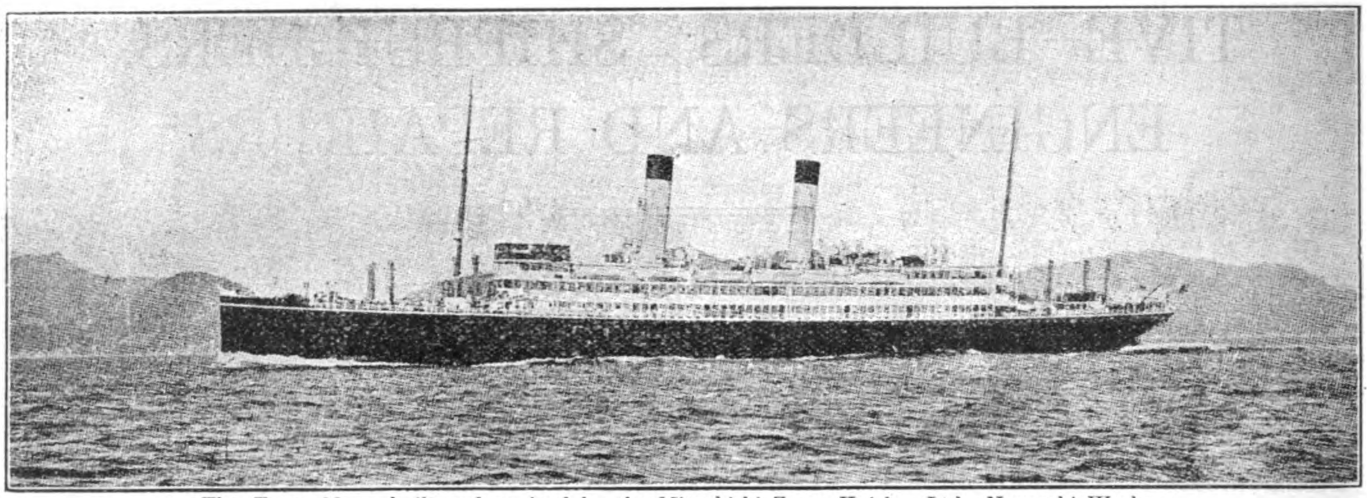
DREDGES OF ALL KINDS
TSUTSUMI'S PATENT DOUBLE ACTING AIR PUMPS

DRY DOCKS: No. 1, 500-ft. long; 70-ft. wide; 35-ft. deep.
No. 2, 457-ft. „ 66-ft. „ 32-ft. „



The *Tenyo Maru*, built and engined by the Mitsubishi Zosen Kaisha, Ltd., Nagasaki Works

MITSUBISHI ZOSEN KAISHA, LTD., NAGASAKI WORKS

(ex Mitsubishi Dockyard & Engine Works, Nagasaki)

DOCK No. 1

Extreme Length	523	Ft.
Length on Blocks	513	„
Width of Entrance on Top	89	„
„ „ „ „ Bottom	77	„
Water on Blocks at Spring Tide	26½	„

DOCK No. 2

Extreme Length	371	Ft.
Length on Blocks	350	„
Width of Entrance on Top	66	„
„ „ „ „ Bottom	53	„
Water on Blocks at Spring Tide	24	„

DOCK No. 3

Extreme Length	728.9	Ft.
Length on Blocks	714	„
Width of Entrance on Top	99½	„
„ „ „ „ Bottom	88½	„
Water on Blocks at Spring Tide	34½	„

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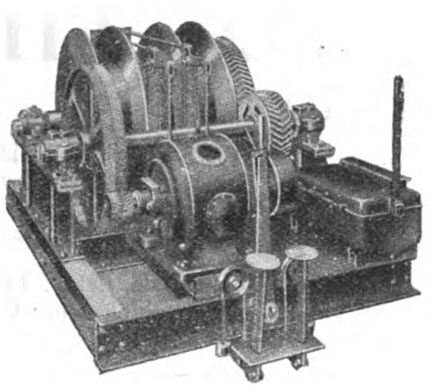

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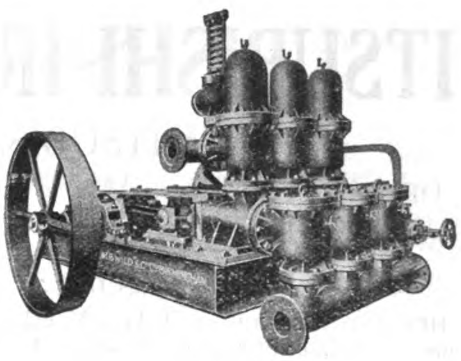

Telephone:
East 208, Birmingham.
Telegrams:
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BIRMINGHAM, ENGLAND

View of Yokohama Dock Co., Ltd.

THE YOKOHAMA DOCK COMPANY, LTD.

Dock Owners, Shipbuilders, Repairers, Engineers, Machinists, Boiler Makers and Warehousemen.
Operating Dockyard, Shipbuildingyard and Storage Warehouses at Yokohama, Japan.

Head Office: Nagasumi-cho :: ***Warehouse Office:*** Midori-cho

Builders for
United States Shipping Board,
Japanese Navy,
Nippon Yusen Kaisha,
and other Principal Shipowners

Cable Address:
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Code Used:
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DRY DOCKS:

No. 1	625′ × 80′ × 28′
No. 2	380′ × 50′ × 26′
No. 3	480′ × 63′ × 21½′

SHIPBUILDING BERTHS.

No. 1	400′ × 27′
No. 2	490′ × 30′
No. 3	580′ × 36′
No. 4, No. 5	680′ × 38′

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Iron Building	8,871.57
Concrete Building	1,636.99
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Complete Facilities for every Work and Fully Equipped up to date for

All Repairing Work. **All Engine Work.** **All New Ship Work.** **All Boiler Work.**

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Shipbuilders, Engineers, Boiler Makers and Machinists.

Manufacturers of

Boilers, Mitchell's Luffing Cranes, Girders, Bridges, Marine Pumps, Turbines, Hydraulic Machinery, etc.

Licensees of

Woodeson's Water Tube Boilers and Clarke, Chapman & Co.'s Pumps

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Branch at WAKAMATSU, CHIKUZEN (Kyushu).

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President: Dr. KAICHI WATANABE
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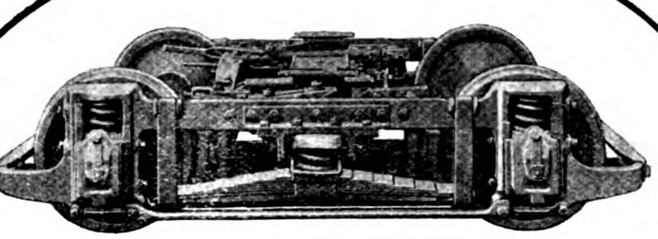
General Managers of the

KYODO UNYU KAISHA

YOKOHAMA

3 KAIGAN-DORI, ITCHOME
YOKOHAMA
WITH TWO BRANCHES IN TOKYO



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24 or 26-in. Wheels

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THE illustration is one of our Calenders of the heaviest and most powerful type for the production of the well-known "Silk Finish" on cotton goods by embossing a series of very fine lines on their faces. These Calenders can be driven by electric motor, by double cylinder diagonal steam engine, or by pully and clutch.

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Some Specialities:
Gas Singeing Machines. Mather Kiers.
Open Width Bleaching Machinery.
Mercerising Ranges.
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High-Speed Beetling Machines.
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Spray Damping Machines.
Calenders for all Purposes.
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Two-bowl Hydraulic Lustring Calender

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WAREHOUSING, FORWARDING AND EXPRESS CO.

SHIPPING BROKERS
LANDING STEVEDORES
CUSTOM HOUSE WAREHOUSEMEN

WAREHOUSING AREA - - - - - - - - - 77,000 tsubo (308,000 Sq. yds.)
VALUE OF GOODS IN WAREHOUSE (latest date) - - - Yen 275,000,000
CAPITAL (PAID UP) - Yen 5,000,000; RESERVE FUND - Yen 3,098,400

President: TOKUEMON MITSUI
Managing Directors: S. YADA and H. OKUMURA
Directors: K. HAYASHI and K. FUKUI
Auditors: T. MITSUI and T. MAJIMA

HEAD OFFICE: No. 5 HONKAWAYA-CHO, NIHONBASHI-KU, TOKYO

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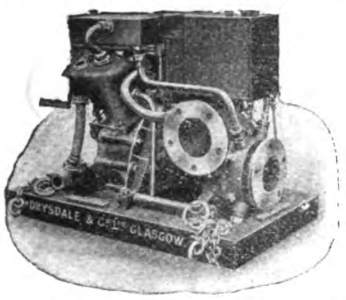
YOKOHAMA—Shinko-cho
KOBE—Kano-cho
MOJI—Hama-cho
SHIMONOSEKI—Kannonzaki-cho

"BON ACCORD"

CENTRIFUGAL PUMPS



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Require offers, samples and consignments. Bank reference. De Hollandsche Bank voor de Middell. Zee. (The Dutch Bank for the Mediterenean—Amsterdam.)

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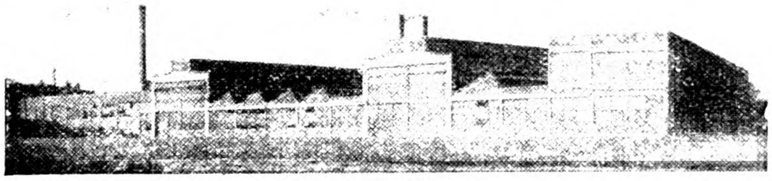

General View of the Betts Machine Company's Plant

For the creation of good accurate work, the surroundings and conditions under which men labor must be conducive to happiness and health.

The works of the Betts Machine Company, started by A. & E. Betts in 1861, is erected in a large open space giving the most daylight for the machine operations, and away from the congestion of the metropolis.

This works includes machine shop, pattern shop and the foundry building. The works covers about 190,000 square feet, and is of the most modern construction with all conveniences tending towards high production and accuracy of products. It is on the main lines of the New York Central Railroad between Buffalo and New York. The General Sales and Main Office of the Company is located at the works. Visitors from abroad are always welcome and will be shown through the plant.

A Betts Machine Tool for every need in heavy duty work. Let us have your problems.

Engine Lathes, Axle Lathes, Journal Trueing Lathes, Vertical Boring and Turning Mills, Tire Turning and Boring Mills, Horizontal Boring Machines, Planing Machines, Slotting Machines, Multiple Spindle Milling Machines and Munition Manufacturing Machines.

Cable Address "Betts" Rochester

BETTS MACHINE COMPANY

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Established in 1861

ANDERSEN, MEYER & CO., LTD., Shanghai, China

Exclusive Representatives for China and Manchuria

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FAST SERVICES:—

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Trans-Pacific between Oriental ports and West Coast of N. America.

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(PASSENGER AND FREIGHT STEAMSHIP SERVICES)

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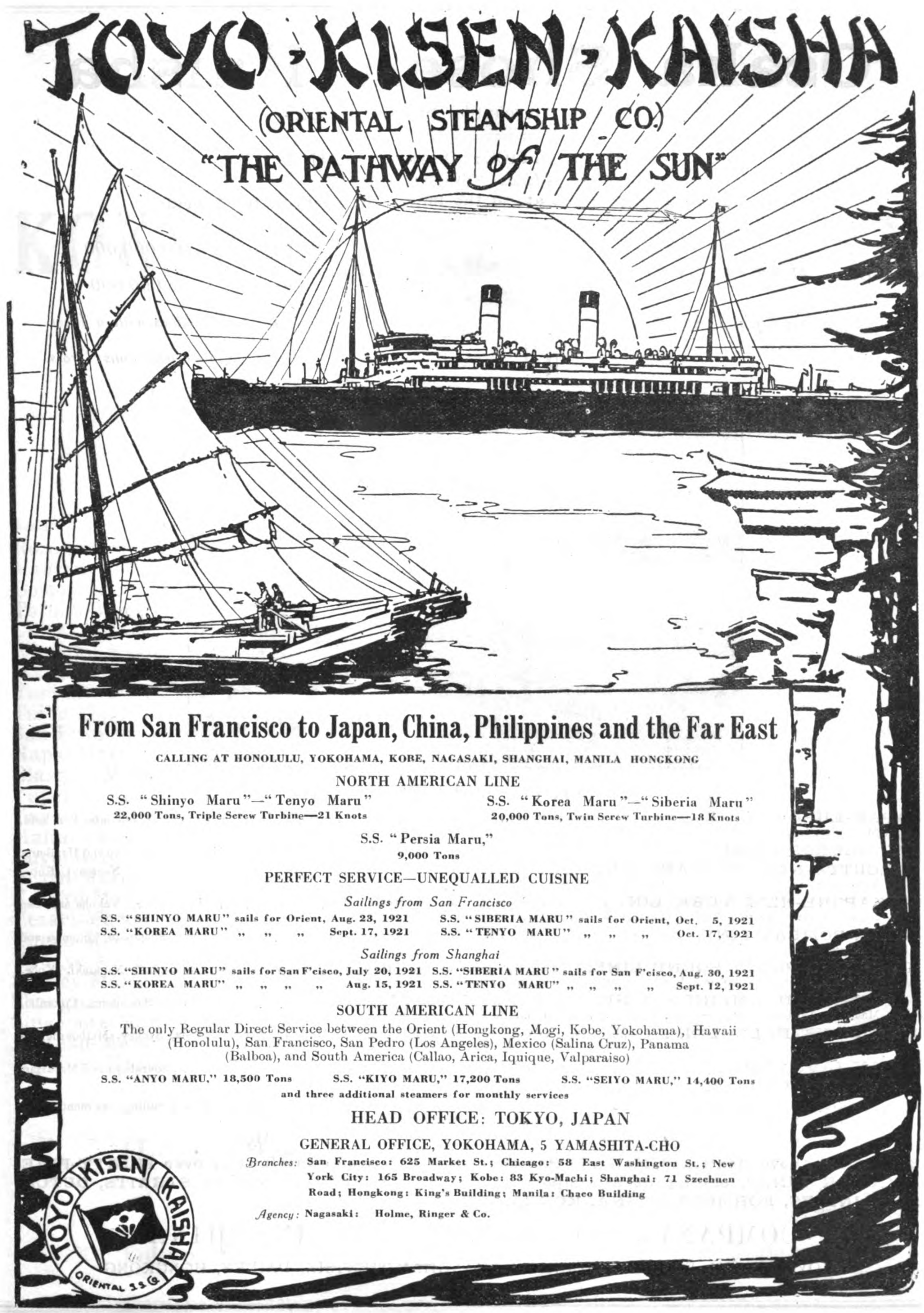
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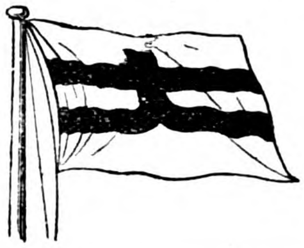

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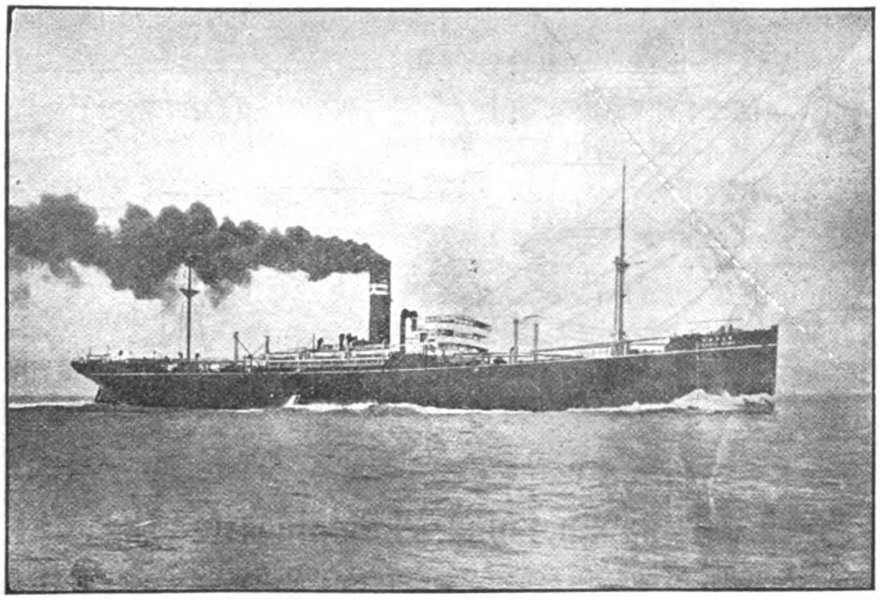

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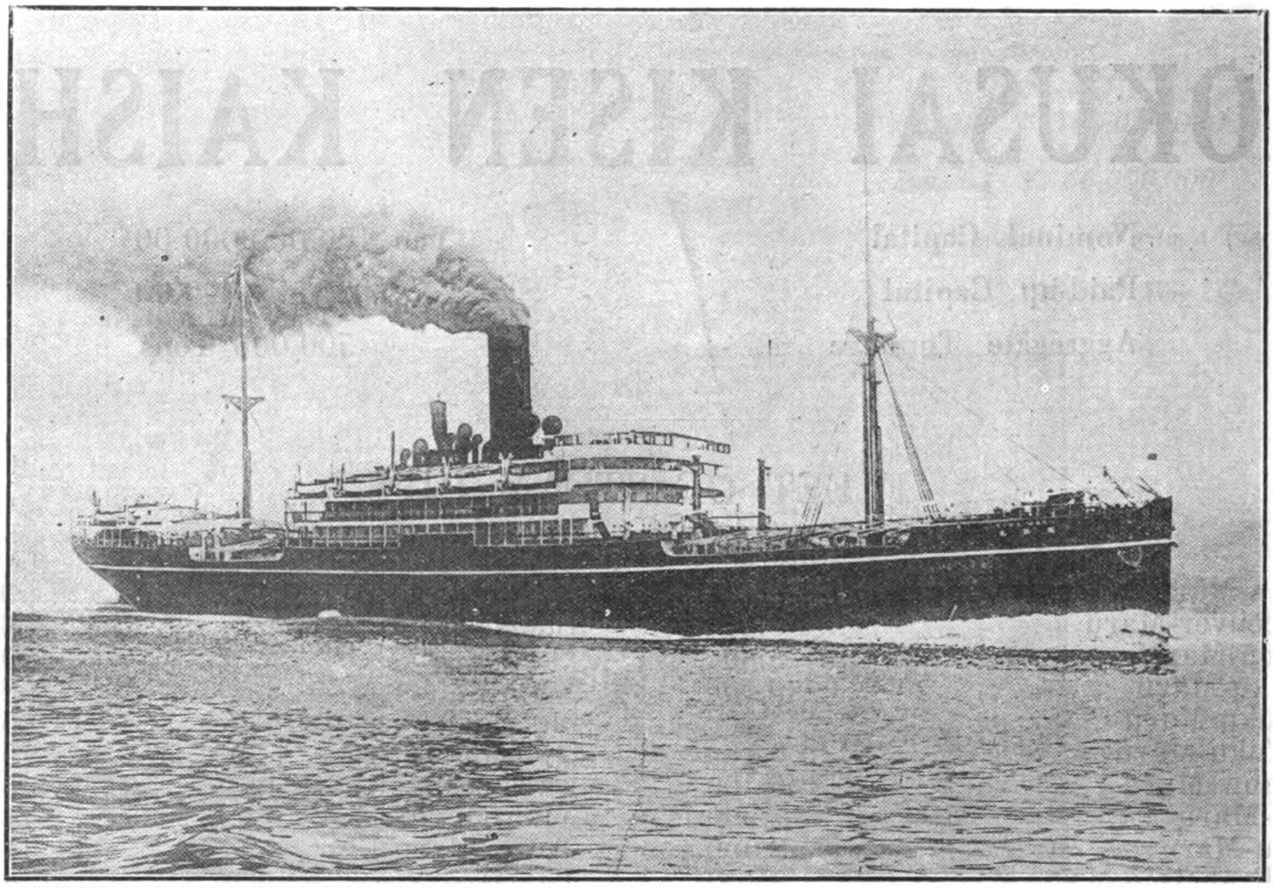

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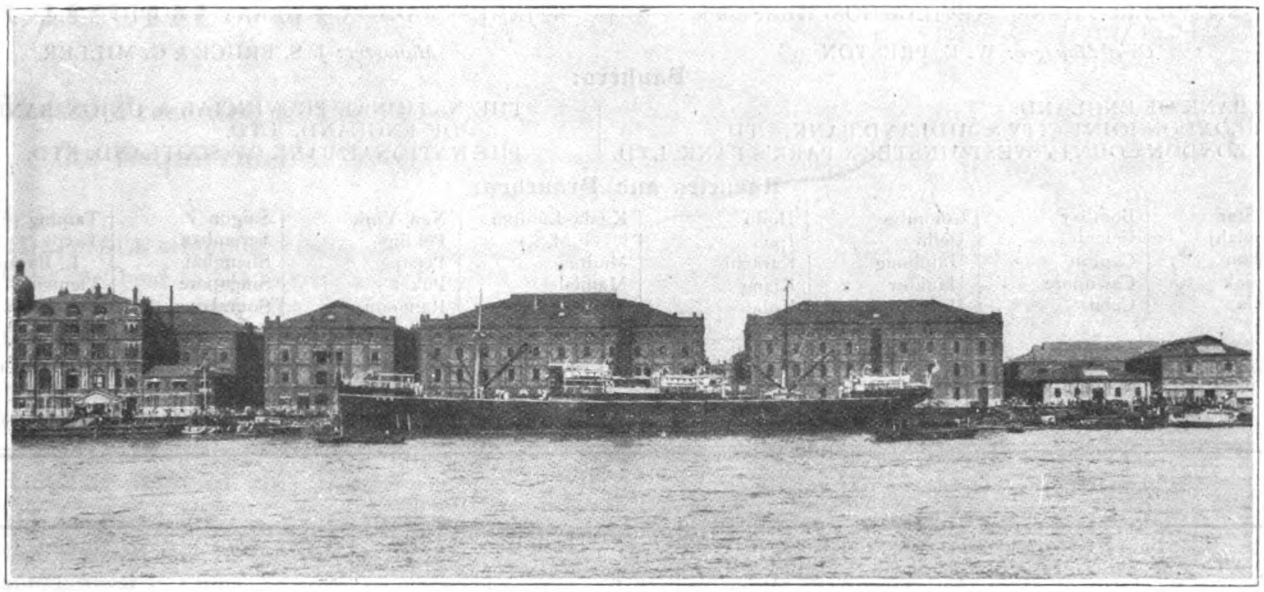

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The Far Eastern Review

ENGINEERING FINANCE COMMERCE

VOL. XVII SHANGHAI, AUGUST, 1921 No. 8

A Chemical Study of Chinese Portland Cement and Local Raw Materials

A Thesis Presented to the Faculty of Soochow University in Partial Fulfilment of the Requirements for the Degree of Master of Arts, by C. H. Zee, B.S.

CONSIDERABLE attention is being paid at the present moment in China to the development of a Portland cement industry, and the following paper by a Chinese engineer student who has carried out extensive analytical work should be of value and interest, not only to the promoters of new enterprises but to the foreign manufacturer of cement machinery.

1.—The Aim of this Study

The aim of this study is to determine by exact chemical analysis the percentage compositions of the various samples of Portland cements manufactured in China, to compare the results thus obtained with the usual standard compositions of American Portland cement; to determine the percentage compositions of samples of raw materials found locally; and to consider whether or not the raw materials analyzed may be used for the manufacture of Portland cement. In this paper are set forth clearly though briefly the processes used in the analysis, the results obtained and the conclusions derived from this study. A historical sketch of the Portland cement industry and a brief description of the methods of manufacture are also included.

2.—Historical Introduction

Portland cement is an artificial chemical product of fairly definite composition. It contains approximately 60 to 65 per cent. of lime, 19 to 25 per cent. of silica, 5 to 12 per cent. of iron oxide and alumina. The percentage of each of these four constituents may vary, but only within a narrow range. Hence Portland cement is a definite product, capable of being expressed very closely by an empirical formulæ.* This is one of the few points which distinguish Portland cement from the various brands of natural cements which were exclusively used before its invention.

Although the Portland cement industry has attained great importance now, it is less than a century old, quite young as compared with the steel and iron industry, for example. It was in the year 1824 that Joseph Aspdin of Leeds, England, received a patent for a cement product of his own invention, which he named "Portland cement," because of its resemblance to the colitic limestone of Portland, a very well-known English building stone at that time. Although Aspdin was almost immediately engaged in the commercial manufacture of his new cement, using his wet-mixing and grinding method to be described later, yet for more than twenty years the growth of the Portland cement industry was exceedingly slow, notwithstanding the fact that the people of the continent took up the industry with great eagerness. One reason for its slowness in growth is to be found in the high price of the new product as compared with the natural cements previously used. About 1850, however, a distinct increase in the use and production of the Portland cement, both in England and on the continent became noticeable. From this time on the Portland cement industry met with every success. It not only displaced natural cements of the older type rapidly from all European markets, but also because an important article of exportation to both Asia and America.

In the United States of America, the first attempt at Portland cement manufacture was evidently made in 1872, when an experimental plant was constructed at Kalamazoo, Michigan. Within the next ten or fifteen years, many plants were established in different localities; and the introduction of the improved methods of ignition and grinding finally revolutionalized the Portland cement industry. This has intimate connection with the method of manufacture, and is to be further described in that section. The marvelous development of the Portland cement industry in the United States may be shown by comparing the total annual production of 42,000 barrels in 1880 with 88,230,170 barrels in 1914. The price per barrel fell correspondingly from $3.00 in 1880 to $1.09 in 1910 and $0.927 in 1914.

Here in the Orient, Japan seems to be leading in the cement industry. There are sixteen companies in Japan and twenty factories. Exports have gone up steadily from 67,651 barrels worth $163,500 in 1911 to 668,613 barrels worth $1,229,000 in 1916.

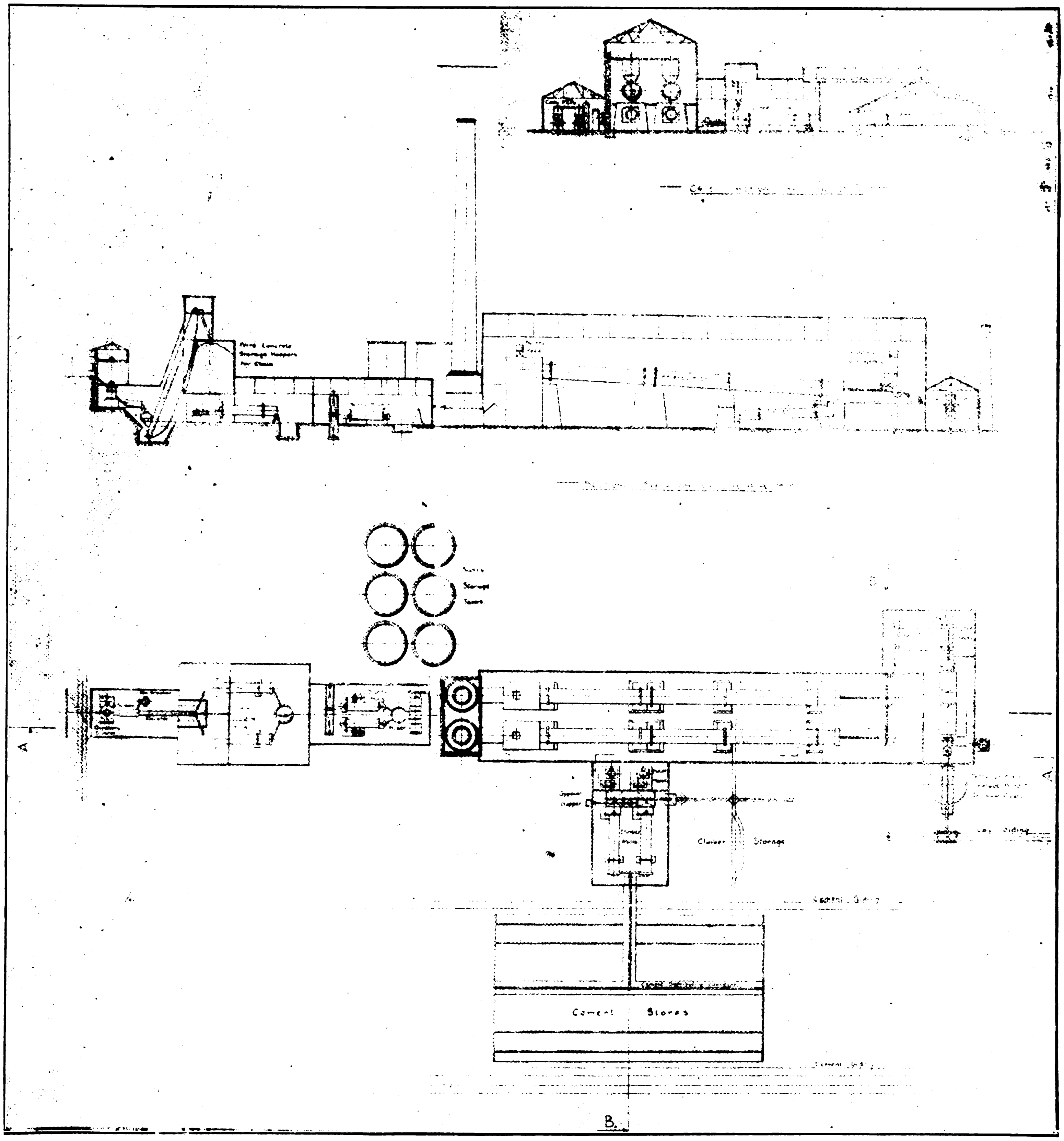
In China, the factory at Tangshan, Tientsin, known as "Chee Sing Cement Company" is doing a good business. Their product is said to have been repeatedly tested according to the British methods by specialists from Great Britain, Germany and Japan. With respect to fineness, setting time, tensile strength and soundness, they have found it to be comparable with the best product of foreign countries. In the industrial exhibition held at Nanking in the fall of 1910, the Chee Hsing brand of cement obtained first honors. It has been extensively used in the construction of railways. The steel bridge across the Yellow River in the Pukow-Tientsin Railway was built with the aid of this cement. And it was considered by

* Three different formulæ proposed by various authorities, are given in Thorp's "Outlines of Industrial Chemistry," page 170.

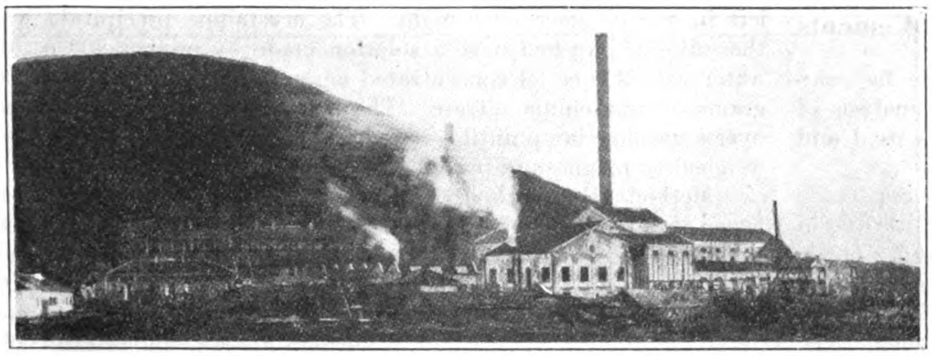
the engineers to be perfectly satisfactory, showing no sign of yielding under three thousand blows by a machine weighing four and a half tons.

The "Chee Hsing" factory, however, is probably not the one first established in China. The cement factory at Hankow, Hupeh, was established first, and has been known to the industrial world here for many years. This factory also received honors at the Nanking industrial exhibition of 1910. A cement-made coffin and cement-made railroad cross ties were put up by this company, and they received much praise. But recently it has been reported that this company has stopped business.

Another factory for cement manufacture is located at Hongkong, established by the joint capital of Chinese and foreigners. The raw materials are obtained from Tsingchow, a district of Kwangtung province, hence this kind of cement is known as "Tsingchow cement." It is sold at Shanghai at 4.2 taels per barrel of 375 pounds. It is claimed to be the best cement in the Asiatic market in quality and in strength. It is extensively used by the British and American governments for building purposes in Hongkong, Singapore, the Malay States and the Philippine Islands. There is a fourth factory at Tsingtau, but since the Japanese occupation, nothing has been heard of it.



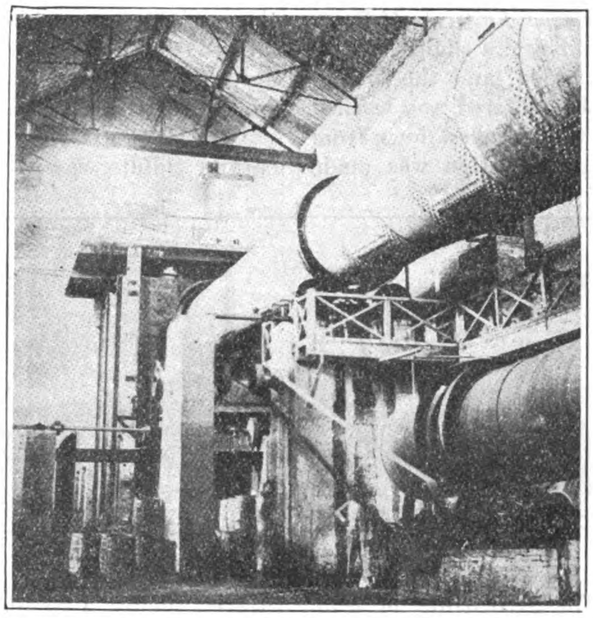
General Arrangement of an Edgar Allen Wet Process Plant



Hupeh Cement Works

3.—Methods of Manufacture

The essential feature of cement manufacture is the formation of a fairly definite chemical product from a mixture of altogether unlike substances under the action of intense heat. That this may be properly performed, and that the resultant product may be in such shape as to be ready for use, three stages of manufacture are necessary, whatever the details of the processes may be. First, raw materials of proper chemical and physical composition must be thoroughly mixed in proper proportions, drying and grinding to a very fine powder being sometimes necessary to secure this intimacy of mixture. Then the mixture thus obtained must be burned at this very high temperature until the constituents unite physically and chemically as a clinker mass, and lastly this clinker mass must be finely ground again. The product of these processes is the Portland cement of commerce.

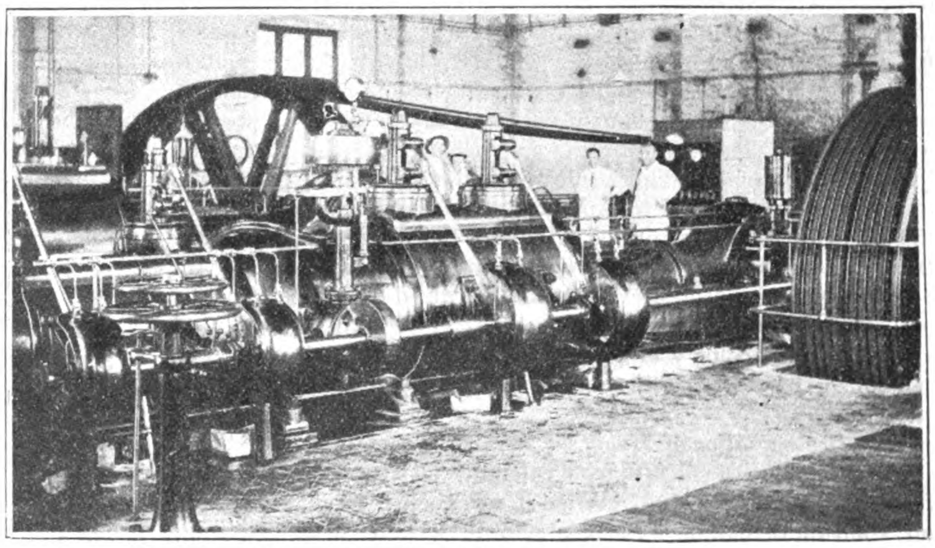


Tube Mills, Hupeh Cement Works

The method used by Aspdin, the inventor of Portland cement, and the earlier European manufacturers is known as the "wet-mixing and grinding method." The raw materials were mixed and ground in a wet condition, and burned in stationary vertical kilns, the resulting clinker was then ground by millstones. But recently the dry process has been generally preferred, as it is simpler and cheaper. Also, in the modern factory, the stationary kiln and the millstones have been replaced, respectively, by the rotary kiln and modern grinding machinery. Both these improvements were made through the inventive genius of American engineers.

The rotary kiln consists of a cylinder of steel, frequently 100 to 150 feet in length, and a few larger ones even attain the length of 250 feet. This lengthening of the kiln keeps the raw material in contact with the hot gases for a longer time, and consequently allows it to abstract more heat from them. In its old type, which was much shorter, the rotary kiln was very wasteful of fuel. The rotary kiln is lined with firebricks and set at a slight inclination to the horizontal. It revolves on two or three tires and is turned by a gear and pinion. The mixture of raw materials, either dry as when limestone or cement rock is used, or wet when marl is used, is fed in at the upper end of the kiln by means of a screw conveyer. It travels slowly downward toward the burning coal under the influence of gravity as the kiln is revolved, and during the two or three hours' passage through the furnace it is thoroughly calcined. The fuel, usually in the form of powdered coal, is blown in by an air blast at the lower end of the furnace, which is covered by a movable firebrick hood. In rare cases, oil or producer gas is used. The burned clinker also falls out at this lower end through a hole in the hood into a contrivance which conveys it to an upright cooler for cooling.

As to grinding the raw materials, different methods are used. In case of cement rock and limestone, the materials are ground dry by (1) crushers, (2) rolls, and (3) Griffin mills, or (1) crushers, (2) ball mills, and (3) tube mills. Gyratory crushers are exclusively used for the first stage of grinding. For finer grinding, Griffin's and Huntingdon's mills were at first used; later ball and tube mills came to favor; but at present there seems to be some reaction toward the earlier types. Wet materials—marl and clay—require less grinding than dry materials. The clay is usually broken up in dry pans or edge runner mills, and then together with marl passed through a tube mill before ignition. Gyratory mills are made in many sizes, and require from 1 to 1.2 horse-power per ton of rock crushed per hour, depending on the hardness of the rock. The Griffin mill is a steel roll, revolving on a vertical shaft with a gyratory motion, and pressing by centrifugal force against a steel ring. It has great capacity, and will grind so fine that about 90 per cent. of the product will pass through a 100-mesh sieve. A Griffin mill of ordinary size will turn out from three to five tons of rock per hour, and requires 25 to 28 horse-power to run it. A ball mill will usually grind from 4 to 6 tons of raw material and from 12 to 16 barrels of clinker per hour. In doing this it will consume 30 to 40 horse-power. The tube mill is a horizontal iron tube, about 16 feet long by 4 feet in diameter, rotated some 25 times a minute by gears. It usually requires 75 to 80 horse-power and turns out from 5 to 7 tons of raw materials, or from 12 to 16 barrels of finished cement per hour. For further descriptions of these machines, a text may be consulted.



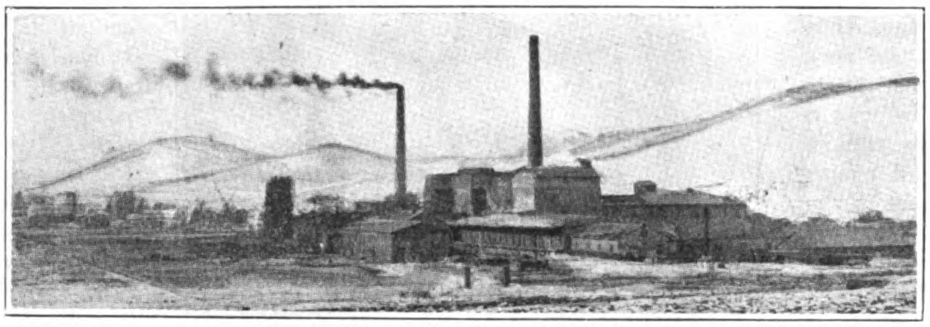
Engine Room, Hupeh Cement Works

4.—Chemical Analysis of Chinese Portland Cements

Three samples of cement were obtained from the factories at Hankow, Tientsin and Hongkong, and a chemical analysis of each sample was made. Below are given the methods used and the results obtained.

1. *Determination of Silica, SiO_2.*—The sample was first made to pass through a 100-mesh sieve; thoroughly dried at 100° C. in an air bath; then weighed out from a stoppered weighing bottle in quantities of about 0.5 g. into a porcelain dish. The sample was stirred with 10 cc. of cold water until all lumps were broken and 10 cc. of cold dilute (1 : 1) hydrochloric acid were added. The dish was placed on a water bath and the contents evaporated to dryness, moistened with water and a little hydrochloric acid and evaporated to dryness again. When dry, the dish was put in an air bath and heated for an hour. When cool, the contents of the dish were moistened with 10 cc. of (1 : 1) hydrochloric acid. Twenty cc. of water were then added, and the mixture digested on a wire gauze for 10 minutes. The silica, thus dehydrated, was filtered on a 9-cm. filter, washed ten times with hot water, dried, and ignited to constant weight in a platinum crucible over a blast lamp. It was weighed as silicon dioxide, SiO_2.

2. *Determination of Iron Oxide and Alumina, $Fe_2O_3 + Al_2O_3$.*—The filtrate from silica was brought to a boil, and a slight but distinct excess of ammonium hydroxide was added, and the boiling continued for five minutes more. It was then filtered and washed once with hot water. The precipitate was then washed down from the paper into the beaker in which the precipitation was made by using 20 cc. of 1 : 5 nitric acid and the solution diluted to 100 cc. Ammonium hydroxide was again added to reprecipitate the iron and aluminium. The precipitate was then collected on the same filter paper as used for the first precipitate, thoroughly washed with water, dried, and ignited to constant weight over a blast lamp. The hydroxide of iron and aluminium were changed to oxides by the intense heat and were weighed as such. The reprecipitation and washing were necessary to remove any calcium or magnesium salts that might be present in the first precipitate.



Onoda Cement Factory, near Dairen

3. *Determination of Calcium Oxide or Lime, CaO.*—The calcium was precipitated as an oxalate from a boiling solution by adding ammonium oxalate in excess to the filtrate from the aluminium and iron determination. The precipitate was allowed to settle for 15 minutes or more, filtered and washed ten times with hot water, using as little water as possible. The paper with the precipitate was then transferred to the beaker in which the precipitation was made, and the paper was spread out against the side of the beaker near the top. The precipitate was washed from the paper and dissolved in 50 cc. of dilute sulfuric acid (1 : 4). The paper was folded over and allowed to remain against the side of the beaker. The solution was then diluted to about 150 cc., heated to about 80° C., and titrated with a standard solution of potassium permanganate, which had been previously standardized by means of oxalic acid. When a pink color was produced, the filter paper was allowed to drop in; the color was at once discharged. The titration was then finished by adding the reagent very carefully one drop at a time.

4. *Determination of Magnesia, MgO.*—Two methods were tried.

Method A.—The filtrate from calcium oxalate was acidified, and evaporated to about 160 cc. When it was cooled, 15 cc. of a 10 per cent. solution of sodium hydrogen phosphate and 15 cc. of strong ammonium hydroxide were added with thorough stirring. It was left in a cool place over night. The crystalline precipitate was then filtered, washed with a solution made by mixing 800 cc. of water with 300 cc. of concentrated ammonium hydroxide and 100 grams of ammonium nitrate. The precipitate was dried, ignited over a gasoline lamp until a constant weight was reached. It was weighed as magnesium pyrophosphate.

Method B.—Method A did not give satisfactory results, hence in later determinations a different method was used. The acidified filtrate from calcium oxalate was heated to boiling and treated with an excess of ammonium phosphate. A volume of 10 per cent. ammonium hydroxide equal to one-third of the volume of the solution was at once added, the solution was allowed to cool, and was filtered after allowing it to stand over night. The precipitate was washed with 2.5 per cent. ammonia, dried, and ignited very slowly, the heat being gradually increased until the precipitate was white. It was weighed as magnesium pyrophosphate. The ignition must be gradual, or it is almost impossible to obtain perfectly white precipitate.

5. *Determination of Sulfur Trioxide, SO_3.*—About a gram of the sample was weighed out, silica was separated and determined as above. The filtrate was then boiled, and 10 cc. of a boiling 10 per cent. solution of barium chloride were added with thorough stirring. After standing over night, the precipitate was filtered, dried and ignited. The precipitate was moistened with a drop or two of concentrated sulfuric acid, evaporated to dryness, and ignited again to constant weight. It was weighed as barium sulfate.

6. *Determination of Iron Oxide, Fe_2O_3.*—The filtrate from barium sulfate was acidified with hydrochloric acid and brought to a boil. A solution of stannous chloride in dilute hydrochloric acid was carefully added drop by drop until the last drop made the solution colorless. The liquid was then quickly cooled by cold water, and 15 cc. of a saturated solution of mercuric chloride were at once added, giving a slight, white precipitate. It was then titrated against a standard solution of potassium dichromate, previously standardized with ferrous ammonium sulfate, till a drop of a 1 per cent. potassium ferricyanide solution, tested with a drop of the iron solution, showed no blue color on a white plate. The percentage of iron oxide was then calculated, and the percentage of alumina got by difference.

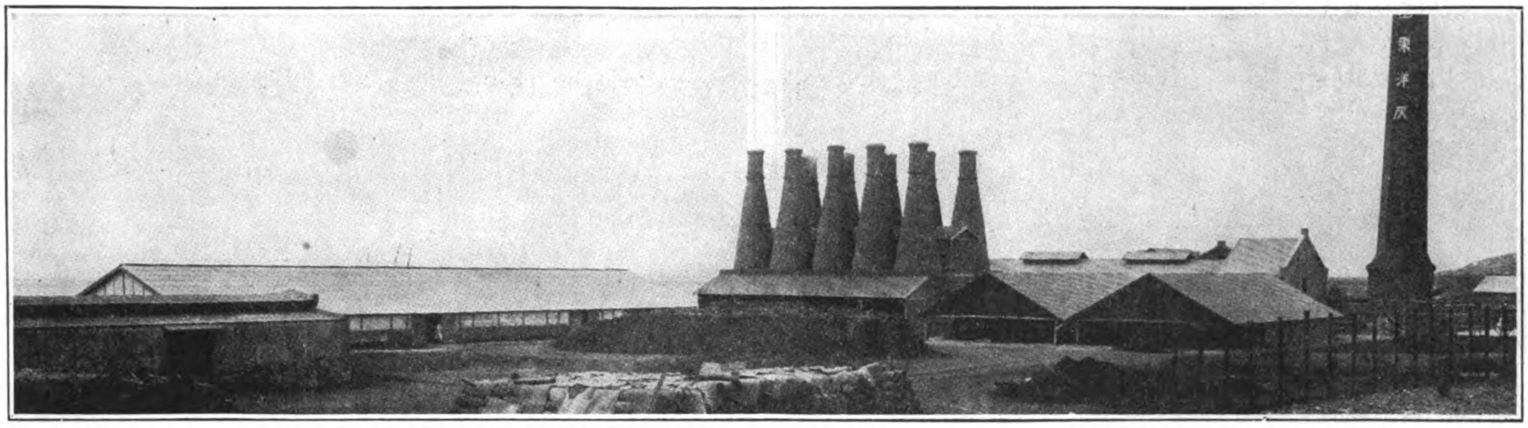
7. *Determination of Ignition Loss.*—About 0.5 grams of cement was weighed out into a weighed platinum crucible, covered with a lid, and ignited, starting with a low flame, gradually increasing the heat and finally heating it over a blast lamp for fifteen minutes. The lid was taken off with the tongs, washed with water from a wash bottle, and heated again to redness. The crucible with lid was then cooled and weighed. The loss consists mainly of combined water and carbon dioxide, driven off by the heat.

The record of the analysis is given below.

Cement No. 1 (Hankow)

	SiO_2	Fe_2O_3	Al_2O_3	CaO	MgO*	SO_3	Ignition loss
1	20.15	4.18	5.40	61.05	1.15	1.66	5.02
2	20.61	4.12	5.22	60.42	1.22	1.75	5.53
3	20.75	4.15	5.22	59.82	1.32	1.86	5.64
4	19.69	4.30	5.43	61.13	1.21	1.75	5.16
5	19.80	4.30	5.23	61.33	1.18	1.67	5.42
6	20.03	4.13	5.34	60.57	1.23	1.82	5.58
Average ...	20.17	4.20	5.31	60.72	1.22	1.75	5.39

* All the magnesia determinations in No. 1 and the first determination in No. 2 were made by following method:—A. In all other determinations method B was followed.



Plant of the Shantung Cement Works, near Tsingtau

Cement No. 2 (Tientsin)

	SiO_2	Fe_2O_3	Al_2O_3	CaO	MgO	SO_3	Ignition loss
1	19.17	4.37	5.71	62.92	1.36	1.52	5.63
2	19.29	4.35	5.76	62.47	1.42	1.55	5.97
3	19.22	4.46	5.86	62.32	1.60	1.54	5.64
4	19.02	4.72	5.55	62.62	1.42	1.55	5.91
5	19.07	4.52	5.23	63.02	1.66	1.55	5.72
6.	19.29	4.78	5.07	62.93	1.38	1.55	5.67
Average ...	19.18	4.53	5.53	62.71	1.47	1.54	5.76

Cement No. 3 (Tsingchow)

	SiO_2	Fe_2O_3	Al_2O_3	CaO	MgO	SO_3	Ignition loss
1	22.27	2.58	6.94	60.43	1.56	1.25	5.13
2	22.00	2.59	6.94	60.50	1.86	1.24	5.05
3	21.98	2.60	7.12	60.47	1.80	1.21	5.00
4	22.19	2.60	7.19	60.23	1.66	1.25	5.03
5	22.25	2.62	7.18	60.19	1.60	1.25	5.11
6	22.00	2.61	7.19	60.31	—	1.28	5.28
Average ...	22.11	2.60	7.09	60.35	1.70	1.25	5.10

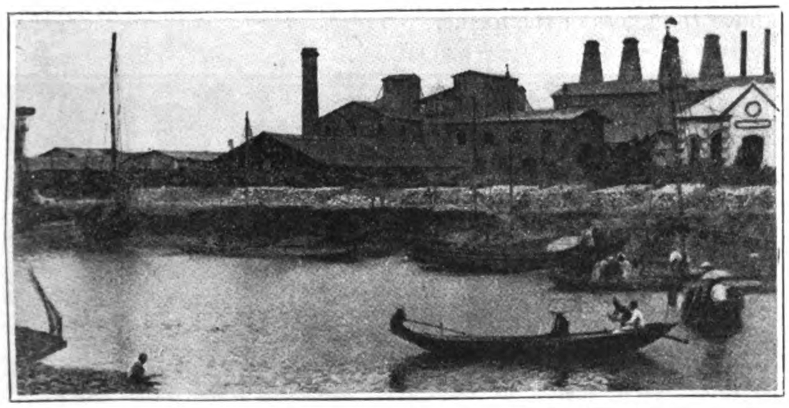
Combining the results into one table, we have

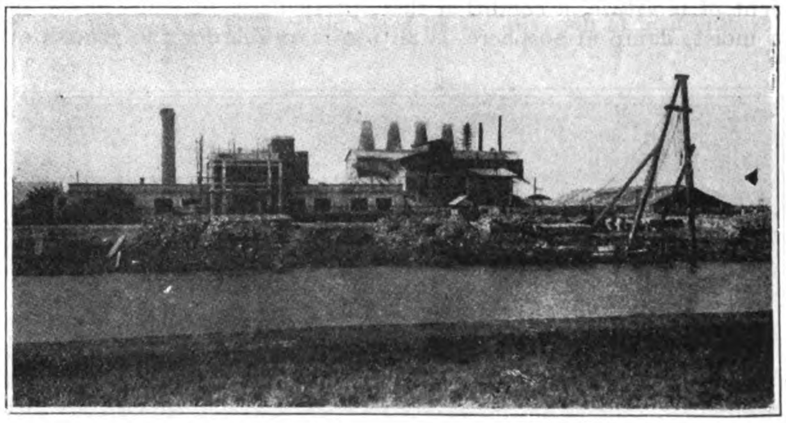
	SiO_2	Fe_2O_3	Al_2O_3	CaO	MgO	SO_3	Ingition loss
Cement No. 1...	20.17	4.20	5.31	60.72	1.22	1.75	5.39
Cement No. 2...	19.18	4.53	5.53	62.71	1.47	1.54	5.76
Cement No. 3...	22.11	2.60	7.09	60.35	1.70	1.25	5.10

5.—Comparison of Chinese and American Portland Cements

Below is given the composition of several samples of American Portland cements for comparison :—

Source	SiO_2	Fe_2O_3	Al_2O_3	CaO	MgO	SO_3	Ignition loss
New Jersey ...	21.82	2.51	8.03	62.19	2.71	1.02	1.05
Pennsylvania...	21.94	2.37	6.87	60.25	2.78	1.38	3.55
Ohio	21.86	2.45	5.91	63.09	1.16	1.59	2.98
Michigan ...	22.71	3.54	6.71	62.18	1.12	1.21	1.58
Virginia	21.31	2.81	6.54	63.01	2.71	1.42	2.01
Missouri	23.12	2.49	6.18	63.47	0.88	1.34	1.81
llinois	22.41	2.51	8.12	62.01	1.68	1.40	1.02

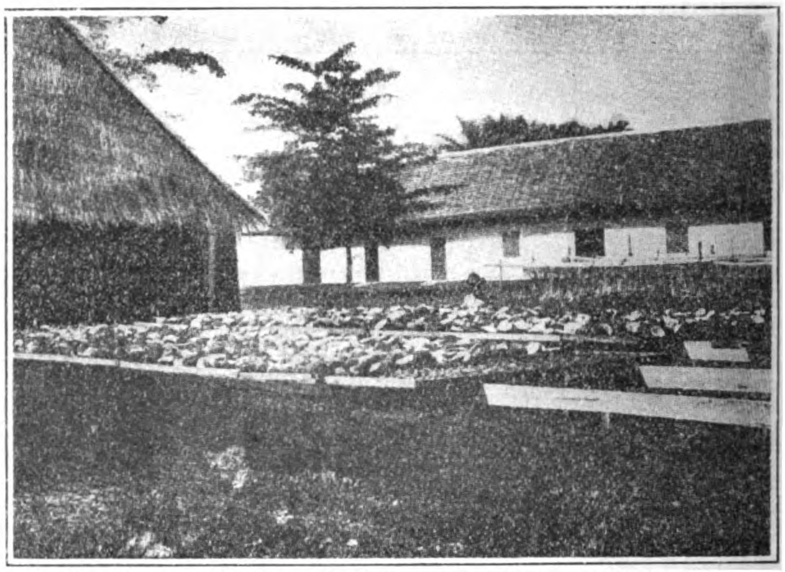




Two Views of the Haiphong Cement Works at Haiphong, Indo-China

In a later issue of THE FAR EASTERN REVIEW there will appear another article on Cement, which, unlike the above, will deal more with detailed descriptions of existing cement works in China and the Far East. The subject is made more interesting because of the large uses to which cement is already put to in the Far East ; and with the prospective development, on a large scale, of harbors, buildings and other enterprises wherein this very useful product is necessary, it is fitting that the source of supply, the quality of supply and the adequacy of supply all bear inspection. —*Ed.*

The Native Method of Husking Coconuts



Sun Drying, Showing the Nuts on the Trays, ready to be Pushed under the Shelter

Mechanical Copra Drying

COPRA is the dried meat of the coconut, and at present constitutes the principal and the most important article of export derived from the coconut palm. The meat is dried in the sun or in artificial driers, among which may be classed the so-called "tapahan" driers, in which most of the Philippine copra is prepared.

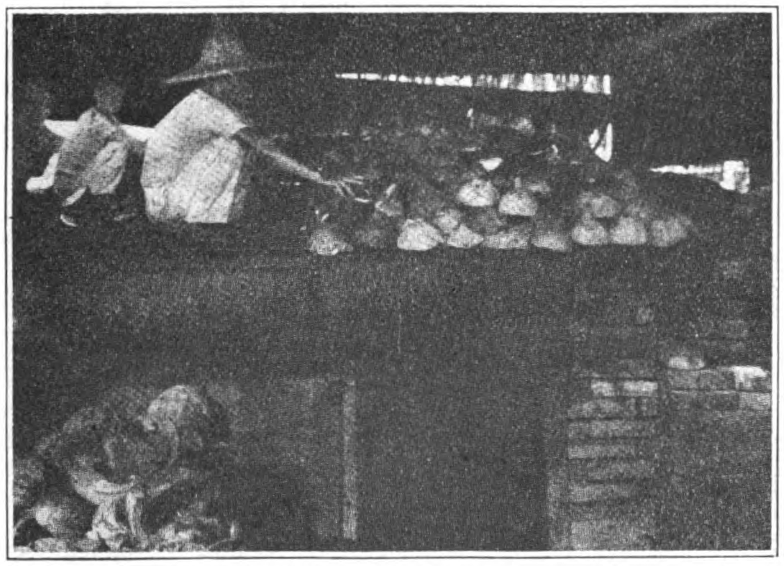
The bureau of science, Manila, has experimented with a method for the preparation of copra by treatment of sulphur dioxide gas, and allowing the meat to dry without addition of artificial heat.

In order to successfully resist deterioration from molds and bacteria and so produce a first-grade oil and secure the highest price obtainable in the market, copra should be made only of fully matured or "cured" nuts ; it should be thoroughly dried so as to make a clean product, containing not more than 6 per cent. of water. Ordinary sun-dried copra contains about 9 per cent. and " tapahan, " or smoke-dried copra, frequently exceeding 20 per cent. of moisture, a condition that, particularly in long storage in a moist, damp atmosphere, is all too favorable for the growth of molds, the foremost enemy of improperly prepared and improperly cared for copra, and the formation of fatty acids at the expense of the oil content. Where climatic conditions permit, sun drying may be resorted to ; in other regions artificial driers must be used.

After the nuts are properly cured they are ready for husking, the first operation in copra making.

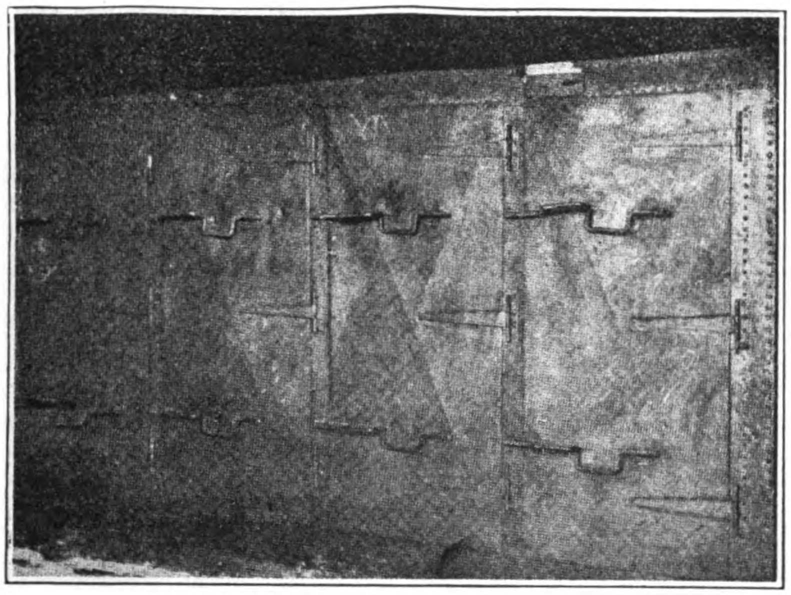
Many attempts have been made to invent a mechanical husker, and several power-driven huskers have been devised and placed upon the market. Whatever the reason, such as have been introduced into the Philippines do not seem to have proved satisfactory and none are in operation. All the husking in the Philippines is done by hand. Considering that an experienced husker can handle 1,000 or more nuts per day, at the present price of labor it seems unlikely that power huskers will supersede manual labor for this process for some time to come.

The husking by hand is a very simple operation and consists of the use of an ordinary sharp plow-point pointing upward, set into a heavy block of wood, and so high that the point is a little above the knees of the husker.

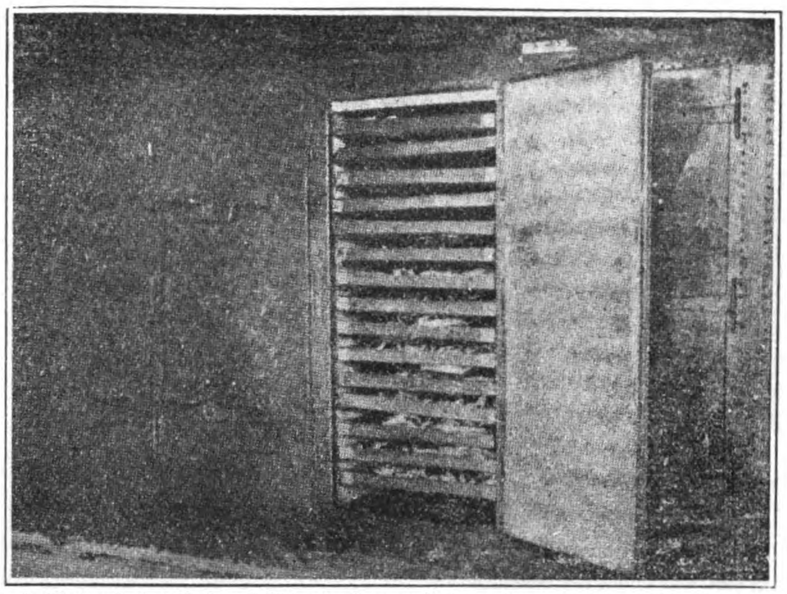


Kiln Drying: The Halves of the Coconuts are Placed over the Grill for the Preliminary Drying

Kiln Used for Drying Nuts



A Unit of the McCord Hot-air Copra Drier



A Unit of the McCord Hot-air Copra Drier, showing the Arrangement of Trays in the Drying Chamber

After husking, the nuts are cut in halves by a sharp blow with a bolo, which, where the copra is sun dried, are placed face up in the sun to dry for a short time until the meat separates from the shell. After this has been attended to the drying of the meat is completed in the sun and the copra is then ready for the market.

A few artificial copra driers are now being operated, but the amount of copra thus produced is still insignificant and for all practical purposes all the copra in the Philippines is still sun-dried or smoke-dried. In the sun drying the halved nuts are first spread on the ground ; as the drying proceeds the meat is collected and placed on palm-leaf mats. The smoke or "tapahan" dried copra is produced by placing the meat on bamboo screens over a crude furnace from which the heat and smoke rises and passes through the bamboo screen and meat. A high-grade product suitable for the manufacture of edible products cannot be made with the "tapahan" drier, which cannot be too strongly condemned, and as a matter of fact the abolition of this system of drying is only a question of time, when the difference in price between clean, sun-dried or machine-dried and smoke-dried copra will be so great as to automatically force the "tapahan" drier out of business.

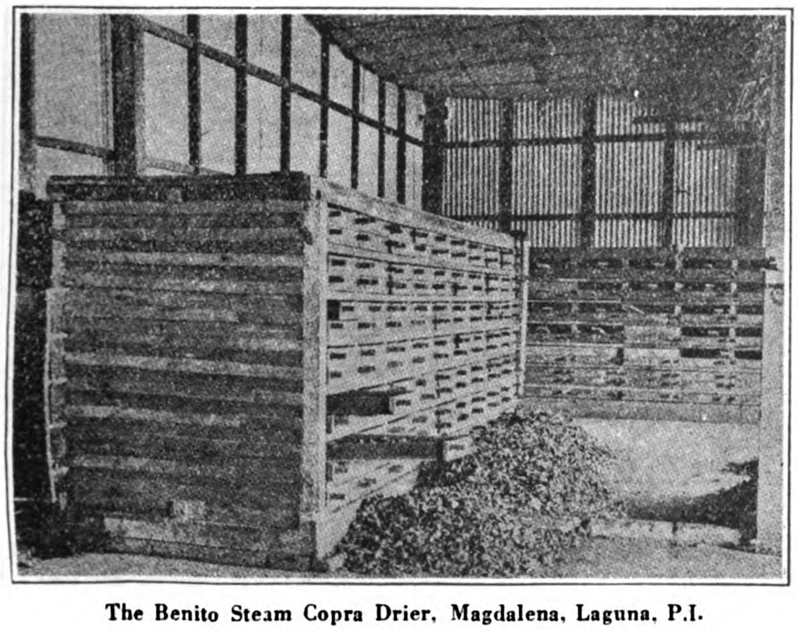
In the rainy coconut districts artificial driers will of course be imperative, but in those regions where the bright days are sufficient to render the perfect drying of the meat practicable, for instance in Cebu and Bohol, sun-drying is particularly well adapted to the needs of the small, individual producer, for sun-light and heat may be had without the asking. However, in order to produce a better and cleaner copra, the present custom of spreading the coconut meat upon the ground should be discontinued. Trays should be made of bamboo, upon which to place the meat for exposure in the sun the same as is done in drying fish. Not only would copra prepared in this way command a premium because of its cleanliness, but the handling of the meat itself from the time of placing it in the sun until sacked would be facilitated ; in the case of threatening rain it would easily and rapidly be placed under shelter.

In the largest coconut-growing areas, however, the planter must reckon on the installation of an artificial drier if he desires to produce a high-grade copra.

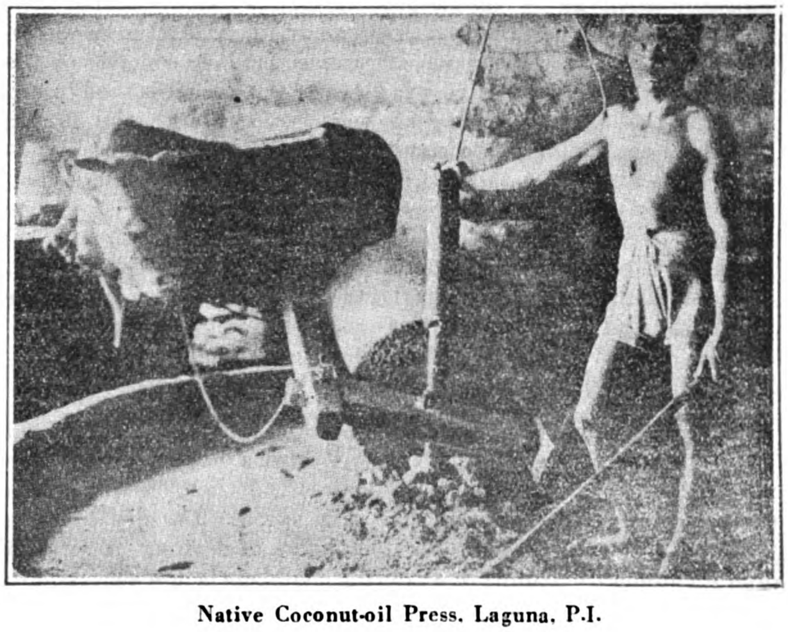
In the case of the small planter the obvious course to pursue would be either to sell his nuts or to organize a co-operative drying enterprise.

Modern copra driers may be divided into two types, those where the meat is dried by means of superheated steam, and those where the meat is dried by hot air. Both types are such recent inventions that we may expect considerable modifications in the models now in use until more perfect driers shall have been perfected.

Probably the first steam-heated drier was designed by Mr. O. W. Barrett, in 1911, then chief of the division of horticulture

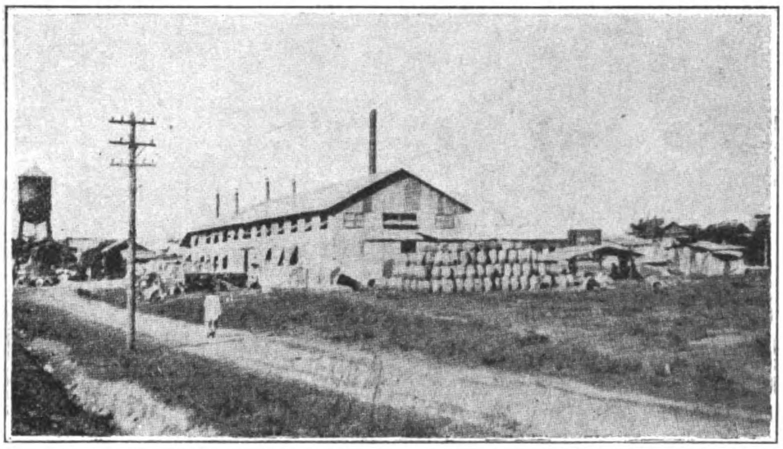


The Benito Steam Copra Drier, Magdalena, Laguna, P.I.



Native Coconut-oil Press, Laguna, P.I.

of the bureau of science. This drier was constructed of sheet iron with asbestos lining between the iron sheets. The steam entered the drier from the boiler in a section of pipes laid in the bottom, above which were trays on which the halved nuts were placed.



Copra Central, San Pablo, Laguna, P.I.

A modification of this drier was later constructed by Pedro Benito in Magdalena, Laguna, in which the steam pipes instead of all being placed at the bottom were installed at different heights between the trays, an obvious improvement in that it insured more equal distribution of the heat. At the San Ramon Farm, Zamboanga, Mindanao, a steam drier has also been installed where the meat is placed in large trays above a system of pipes. All these driers produce copra of good quality, but much remains to be done before the apparatus is perfected so as to render better service commensurate with costs of construction and operation.

One of the most efficient and compact hot-air driers in use in the Philippines to date is probably the McCord drier. This drier, which has been patented and is now manufactured by a company in Manila, is made in units containing eight drying chambers or in double units of 16 chambers, with four doors on opposite sides. Each chamber is 1.13 metres high, 51 centimetres wide and 59 centimetres deep, and contains 15 shallow trays of perforated sheet iron or wire netting which are slid into the chamber on narrow sheet iron flanges. The walls are made of sheet iron with space under and between the drying chambers for the passage of the hot air, this space between the drying chambers being 75 millimetres. The inside walls of the drying chambers are provided with openings for the ingress of the hot air from the bottom and the sides. The moisture-laden air is discharged through a large circular vent at the top. In operating the drier, air is forced by the means of a blower into a chamber above the furnace made in concrete on the level of the floor to be heated ; from there the hot air is then forced through the aforementioned air passages and into the drying chambers containing the coconut meat, whence the moist air, as stated, passes out at the top. Copra containing not more than 5 to 6 per cent. of moisture is turned out of this drier after four hours of drying, the capacity of a double unit at one time being 365 kilos of copra. Under pre-war conditions the cost of construction of a double unit was P.2,500 exclusive of concrete work, power machinery and blower. The McCord drier is well worthy of investigation by any one in the Philippines contemplating the installation of a copra drier.

Another copra drier that appears promising has been invented by Mr. J. L. Pierce, Manila. This is also a hot-air drier. The meat is fed into the drier on an endless wide belt on which it is carried through the machine at a slow speed. The dry copra is passed out of the machine after four hours of drying. A McCord drier including three units or 48 drying chambers is now successfully in operation in San Pablo, Laguna. This drier has a blower that forces 13,000 cubic feet of air per minute through the drying chambers and requires an engine of 12 horse-power.

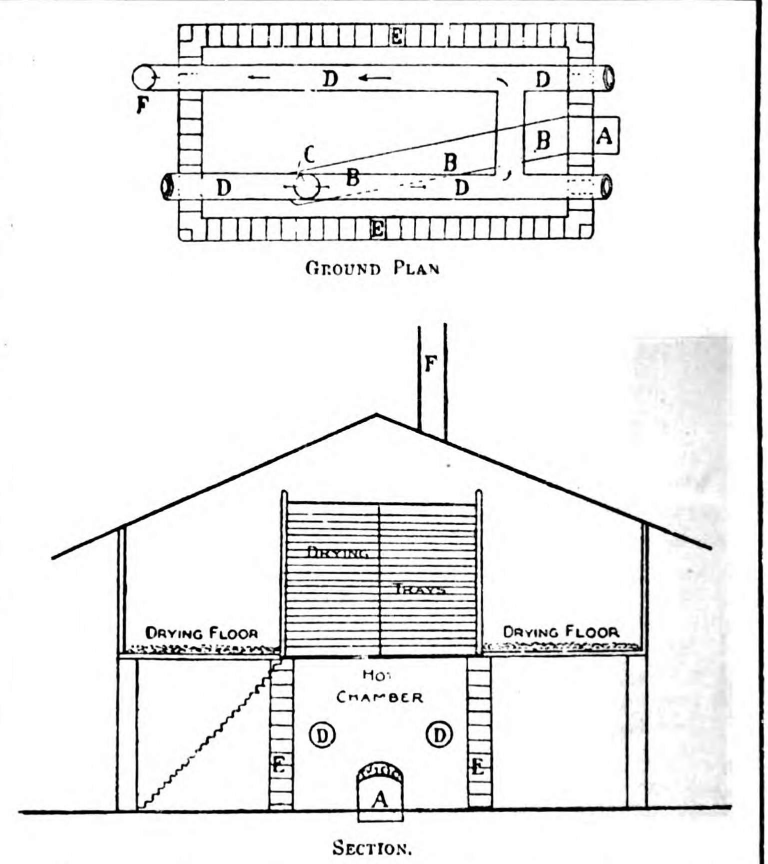
The drying outfit includes a steam boiler for the generation of steam, and a wooden steam vat in which the nuts are steamed preparatory to drying, divided into six compartments. Each compartment is 2.10 metres long, 1.30 metres wide and 1.25 metres deep, with a capacity of 2,000 nuts. The top is hinged so that it can be entirely opened to receive the nuts. The floor is inclined to one side of the compartment which is hinged downward, so that when the steaming of the nuts has been completed and the door opened the nuts automatically roll out upon a platform where they are halved.

The copra manufacture here proceeds as follows :

After being husked, the nuts are thrown into the box and steamed about 10 to 15 minutes. The nuts are then halved, and the meat separated from the shell, which is easily done because of the steaming. The meat is then placed on the trays in the drier and after a period of four hours, which is sufficient to expel the water in the meat, is taken out of the drier, and the dried copra conveyed to the cutting machine through which it passes before being bagged ready for the market.

Dr. E. B. Copeland, formerly dean of the College of Agriculture, Los Baños, quotes in *The Coconut* the following description of a type of copra-drying house used by the Deutsche Handel- und Plantagen-Gesellschaft in Samoa:—

The house the outer walls of which are supported by wooden posts set in cement, is set over a smaller room of masonry, in which the air is heated. This hot room is, in one of the driers described as typical, 5 metres long, 2.3 metres wide and 2.3 metres high. Set into the wall of the middle of one end is the fireplace. A flue of stone runs from the fireplace obliquely, well toward the outer end of the room. It is there connected by a vertical piece of tubing with a horizontal system of sheet-iron flues consisting of two or three lengthwise sections (two in the figure) and the neces-

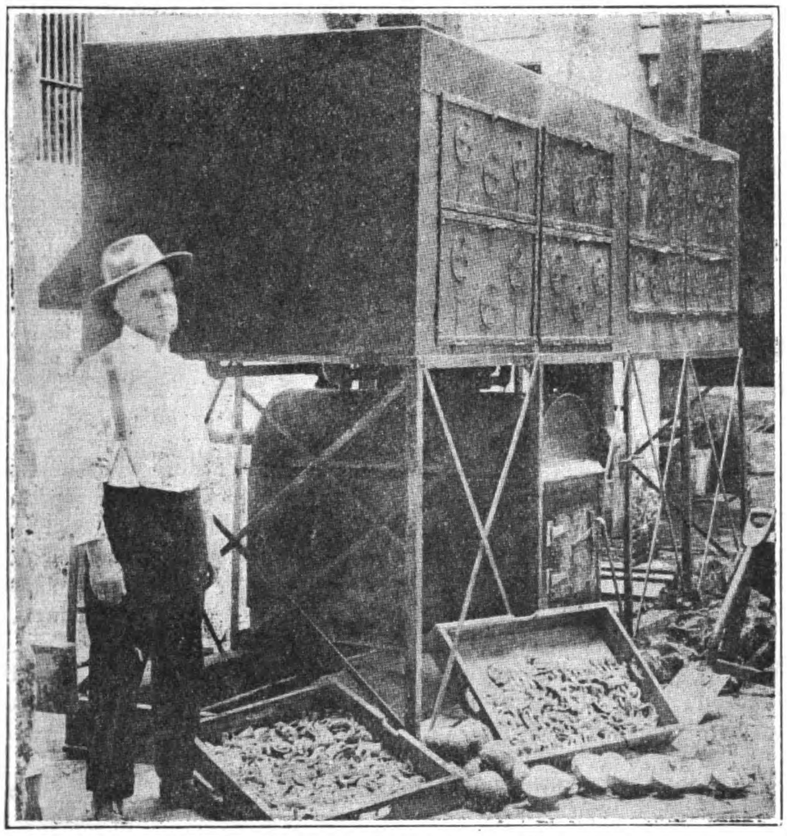


Copra drying house in Samoa. Ground plan and cross section A, furnace, B, masonry flue; C, connection of masonry and iron flues; D, iron flue; E, stone wall; F, chimney.

sary crosswise connections. The iron flues are 30 centimetres in diameter, made locally from sheets. The ends project beyond the walls, and can be opened when the pipes need cleaning. The last flue ends in a chimney 12 metres high. The course of the smoke is indicated by arrows.

The drying room proper is directly over the heating room and very little larger, and the floor between them is merely a grating. In operation the drying room is filled with trays of copra, each holding about three kilos. Different driers have capacity of 200 to 394 trays. The local custom is said to be to remove the copra from the shell without any preliminary drying, which is laborious and inevitably involves breaking it into small pieces. Assuming a yield of 2 tons a year per hectare, a drier then will take care of the yield of 150 hectares. How large an area can well be made tributary to one drier depends of course on the means and cost of transporting the nuts as well as on other local conditions.

In German New Guinea and the Bismarck Archipelago a drier is built for each hectare. Preuss states that one of them will dry 1,700 pounds of copra in 24 hours or 300 tons a year. The temperature is kept near 50° C. When the copra is taken from the drying chamber it is spread over the floor of the building to cool and to dry a little more perfectly. Unless the drying is finished in this way the copra is said to mold ; but with proper treatment the product is of excellent quality. One of these drying houses costs P.3,000 to P.3,500.



McChesney's Hot-air Copra Drier

Steam Drier.—Some time ago the bureau of agriculture introduced a drier containing a series of 2-inch (50-millimetre) tubes, placed near the bottom, through which the steam for drying the copra was introduced. The grade of copra produced by this apparatus was very good and it was found that perfect control could be had in the manipulation of the drier. The steam in this case was produced from the husks and shells of the coconuts under an ordinary boiler.

Another drier has been in use in Laguna province which aims at a better distribution of the heat by having its steam pipes arranged through the apparatus at various heights instead of at the bottom only.

The Mayfarth Drier.—This apparatus is built on distinctly different plans from the above. A blast of hot air furnishes the heating medium, and the partly dried nuts are moved along during the drying by means of a mechanical arrangement propelled by an operator. This apparatus was subjected to extensive experiments by the Compaixa Tabacalera of Manila.

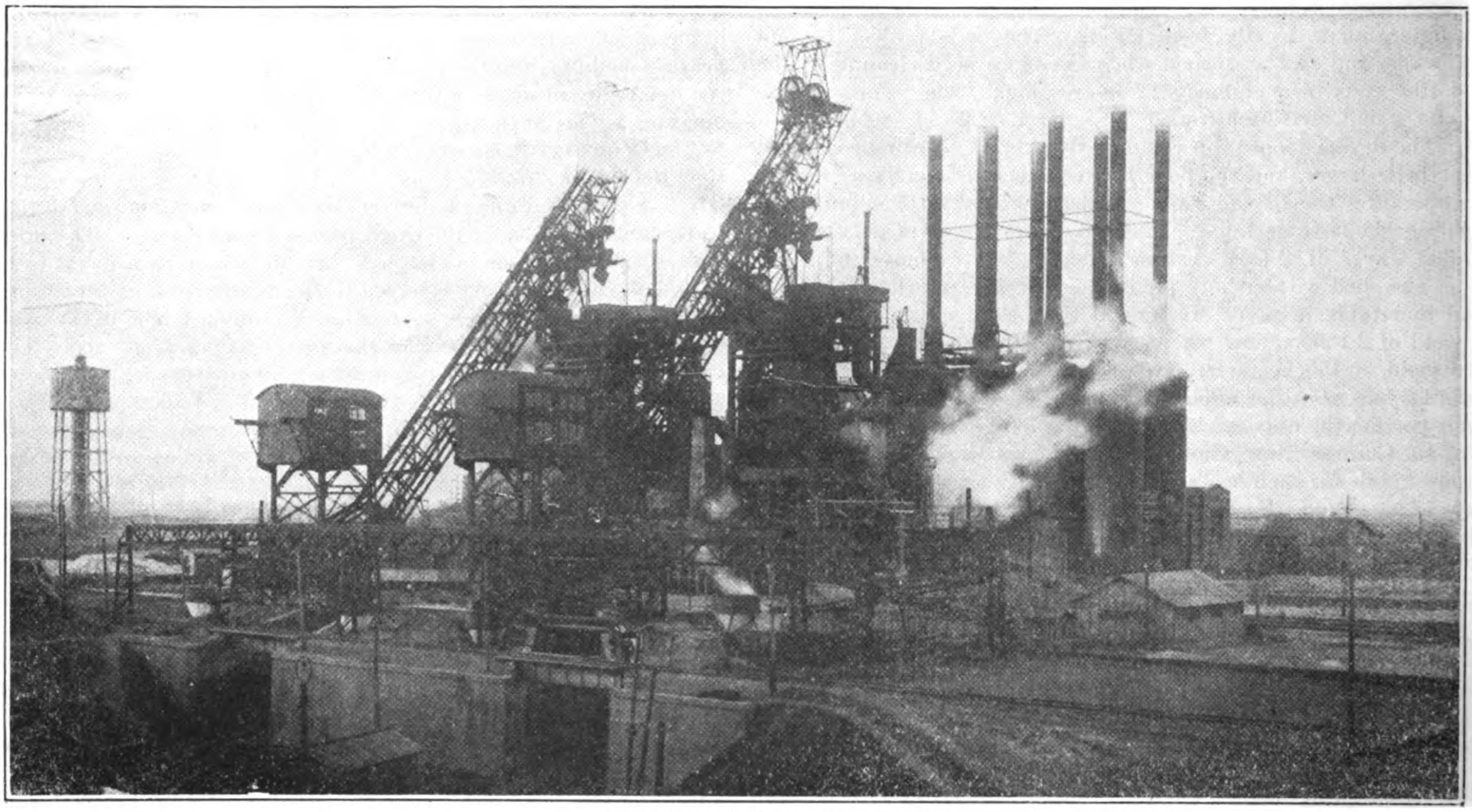
McChesney's Hot-air Copra Drier.—This represents one of the latest designs and one of the very best that has been introduced, so far as the quality of the dried product is concerned. The principle upon which this operates is that air heated in a metal oven placed above the furnace is forced through a series of pipes containing perforations, and thus an air pressure is maintained in the oven itself until a certain amount of the water has been removed. The broken nuts are placed in trays and left to dry for about one hour at a temperature of 90° or 95° after which the shells may be easily removed and the meat cut into strips, which are again placed in trays and dried for about three hours. The temperature during this time is maintained as high as possible without causing decomposition of the tissue, which will result from excessive heat. About three or four hours of this second drying is usually sufficient to produce a first-class copra.

Proper Method of Drying

When the drying is first begun the temperature may be allowed to reach 95° or even 98° until the nuts are ready to be removed from the shell, after which about 85° should be the maximum temperature for the first hour and then a gradual drop should obtain for the two succeeding hours until 65° is reached. Great care must be exercised when the final product is nearly secured, since at this time decomposition from heat may easily result. It is thus better to use a lower temperature and more time during the final drying. Copra dried under these conditions and properly packed should keep well and contain a minimum of fatty acid. Such copra should therefore command the highest price in foreign markets, and cost the producer probably less, or at least no more, than copra obtained by the old methods. One advantage in producing a superior article in any line is that there is always a sure and steady market for this product as well as an opportunity to secure the highest market price.

Chinese Railways

Government railways in China cover 6,410 kilometres. Provincial and private railways cover a further 773 kilometres and "concessioned" railways 3,780 kilometres. Thus the total length of the railway systems of China is 10,963 kilometres, or 6,813 miles. China has, approximately 54,000 of population per mile of railway in operation. This compares in very striking fashion with India, which has 13,000 of population per mile of railway, and in making the comparison it must be remembered that in India a wide extension of the railway system has for many years been held to be one of the essential needs of the country. On the other hand the extensive use of waterways in China will always serve to keep these railway average figures higher than in other countries. The government bureau of economic information at Peking, which draws attention to these statistics, gives at the same time a summary of the results of the working of Chinese railways in 1919 and 1918. In 1919 operating revenues at $83,047,-390 showed an increase of $5,395,237, while operating expenses, at $38,440,541, were $4,117,925 higher. After deducting all charges, the true net surplus in 1919 was $36,449,392, against $33,505,120 in the previous year. The railway system now operating in China is located principally north of the Yangtze River. The Shanghai-Nanking, the Shanghai-Hangchow-Ningpo, and the Hupeh-Hunan lines extend the system into South China. Construction plans are on foot to connect up other short lines operating in the south.



Anshan Steel Works

ANSHAN IRON MINES

THE iron belt of Anshan stretches to Penchihu and holds an immense quantity. The concession held by the Chenhsing Mining Co. includes a region within a radius of 7 or 8 miles with the Anzan Iron & Steel Works as the centre. There are altogether eight mining districts—one each at the east and west of Tangkangtzu Hot Springs styled Hsiaolingtzu and Tiehshihshan. South of Chienshan Railway Station with the railway track running across, there are East Anshan and West Anshan. Takushan lies on the way to the famous Chienshan Mountains. Northeast thereof, there is Kuanmenshan. Turning northward one will come across the two more mines—Wangchiaputzu and Yingtaoyuan. In the main, they fall under the head of hematite mines, but a few of them are mixed with magnetite. Takushan mine contains a comparatively large quantity of magnetite. The same thing may be said of the edge of Wangchiaputzu. The ore bed shows its outcrops on the top of the hill. Although the prospecting work is left unfinished, which circumstance renders an accurate estimate impossible computed on the bases of the outcrops, the average percentage of East Anshan Mine is 27 per cent.; that of West Anshan 30 per cent.: that of Takushan 37 per cent.; that of Yingtaoyuan 28 per cent.; and the others are very much the same. The past experience in mining and prospecting indicates the presence of rich ore in each mine, and if operated on a picking principle, an ore of from 40 per cent. on an average or even of 60 per cent. on an average is obtainable. Up to this date, the picking plan has been pursued in order to supply material to the Anshan Iron and Steel Works. However, rich ore exists irregularly, and is found scattered all over the district in quantities of widely varying range. Accordingly there is no depending on the sureness of supply, for the supply may be exhausted to-morrow. Above all, the rich ore occurs only in a limited amount, as may be easily imagined. Still, the poor ore as above enumerated is hardly suitable as material for the blast furnace. Especially the iron ore of Anshan is generally compact and its particles are very fine. Moreover, almost the whole of the impurity is made up of silicious stone which impedes the smelting process. This state of things would seem to put a very pessimistic complexion on the utility of the Anshan iron mine. However, it holds iron to the amount of over 100,000,000 tons, and this great treasury of nature must be opened somehow. The key to a like treasure house has already been found in the West. Poor ore of a similar quality may be subjected to a mechanical handling to get its impurities to be removed so as to make an artificial rich ore.

Ore-Concentration and Briquetting of Anshan Iron Ore

The iron ore of Anshan is required, prior to being ready as iron manufacturing material, to have its economic value improved by a dressing process. The dressing of iron ore has been developed these twenty years and is in vogue at many places in the West. The method varies according to the nature of the ores. With magnetite, its strong magnetic quality is availed of and what is called magnetic dressing is adopted. Then, with hematite and others, dressing by specific gravity is applied. What is now in most popular use is the dressing of poor magnetite ore. The dressing of hematite is found in the instance of the special class of ore occurring in the Mesaba belt, Minnesota, and outside this, it is conducted supplementarily to the magnetic dressing method.

The Anshan ore, as already stated, is composed mainly of hematite, and only part of Takushan and Wangchiaputzu mines contains magnetite. As to the Takushan ore, from both experimental tests and actual examples in foreign countries, it may be effectively handled by applying some dressing device adapted thereto, but as regards the hematite which makes up most of the ore, there is no foreign example to serve as guide. Nor has this subject been exhaustively studied.

However, three methods may be suggested, that is, (1) Dressing by specific gravity, (2) Magnetic separation, and (3) Magnetic separation after the hematite has been reduced into magnetite.

What is considered as the most promising at present is (3). The results reaped from experimenting upon this method in Sweden were exceedingly satisfactory, but for applying it to practice as a business venture, further study is required. The second method is also promising, but the need of large capital is its chief drawback. The first method is unsuited to the Anshan ore. Thus the question of dressing hematite which takes up the large portion of the Anshan ore can hardly be regarded as solved, although its solution seems only a question of time, once the method therefor has been decided upon.

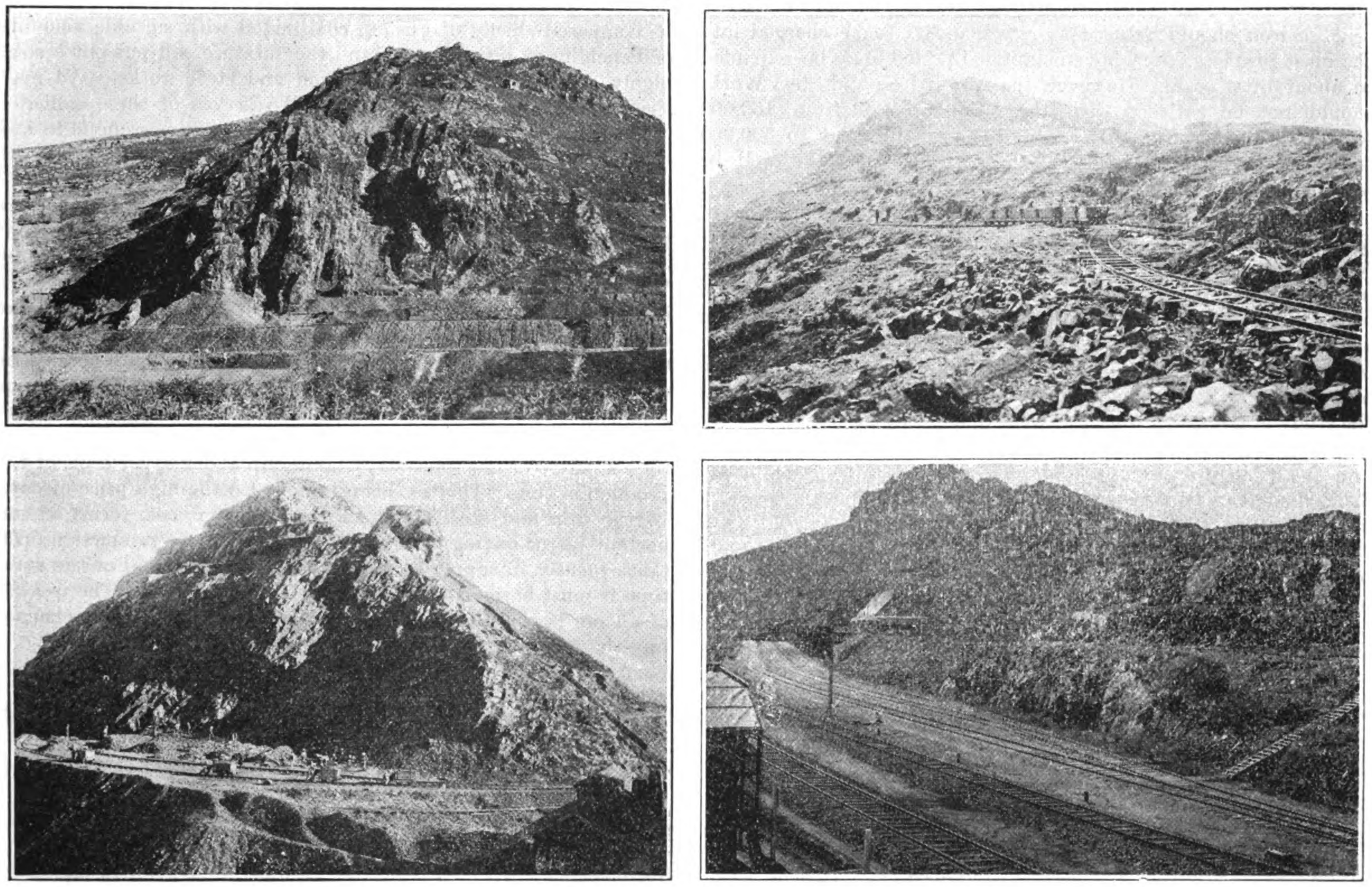
The ore-dressing must be accompanied with briquetting. Ore-concentration is, in most cases, conducted by crushing the ore into a pulverized state, and for this reason, the refined ore obtainable by ore-concentration is found in the form of powder, which is unsuited to be charged into the blast furnace. It must be converted into briquets. There are two ways of making briquets. One is by the use of heat; the other is by the use of a cementing material. The former method is the more popular and has three different processes. One is nodulizing; the second is sintering; and the third is briquetting. In the nodulizing process, something like a revolving furnace used at a cement factory is used to make dust ore into briquets. In the sintering process, the rich dust ore is put in the roasting furnace, mixed with pulverized coal, coke, charcoal, etc. This mixture is then ignited and, by means of ventilation, the pulverized fuel mixed with the dust ore catches on fire and changes the dust ore into briquets. By briquetting is meant to make dust ore into the from of brick by mechanical appliances and to bake it in the furnace.

The above three methods have their own advantages and disadvantages, but sintering is believed to be the most advanced method. All the three methods are in vogue in many countries, and the only thing to be done is to choose what is believed to be the best.

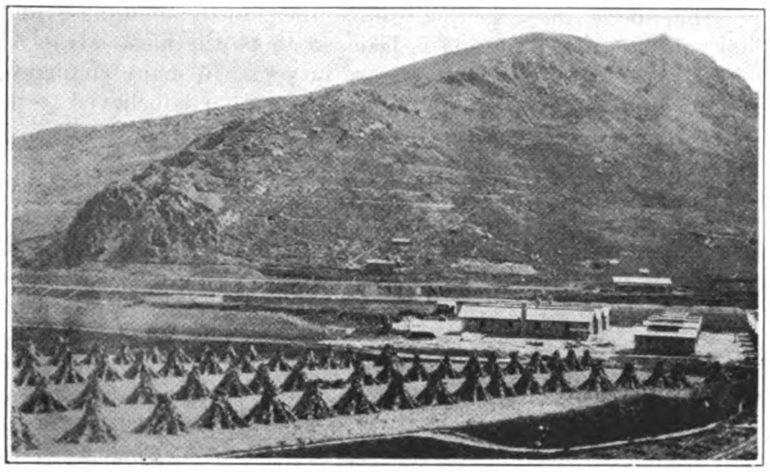
Future of Anzan Iron and Steel Works

The Anzan Iron & Steel Works was originally planned to put out 1,000,000 tons of steel a year. In the wake of the completion of the first part of the program, the second and third parts of the same program were to have been executed. But owing to sundry circumstances, the extension work lies practically suspended. For instance, the two blast furnaces have already been completed, but the steel works that ought to be attached to them has no immediate prospect of being brought into existence. What should be done with the Anzan Iron and Steel Works is a serious and interesting question which deserves careful study from divers points of view. Apart from such practical question, we shall speculate upon the future of the Iron and Steel Works on the bases of the fundamental conditions of its establishment, that is, the supply of raw materials, the markets for the products, etc. The raw materials are iron ore, cokes, lime stone, etc.

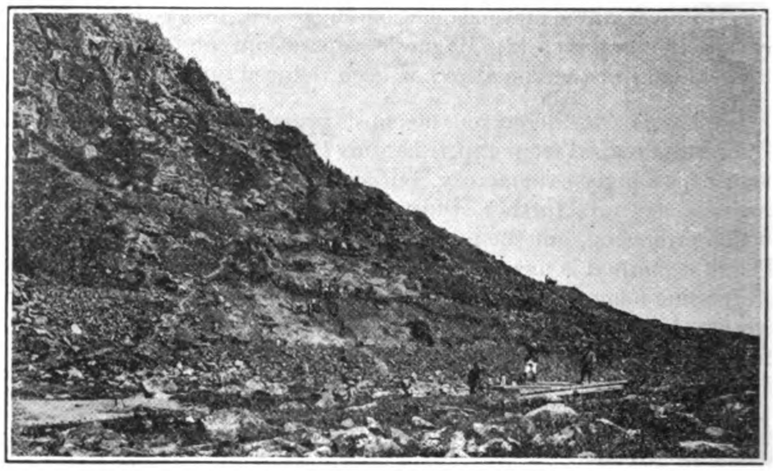
As to iron ore, by the application to magnetite of Takushan of the ore-concentration and briquetting methods for magnetite which have been so happily and economically solved in the West, an artificial rich ore containing more than 60 per cent. of iron, which is decidedly advantageous, may be obtained. Supposing that this artificial rich ore be supplied to the two blast furnaces, a roughly estimated consumption amounts to 350,000 tons. From the estimated ore reserve of Takushan Mine, it may have sufficient to last about thirty years. If the mixture of 66 per cent. of the artificial rich ore and 33 per cent. of natural ore containing 40 per



Views of the West Anshan Iron Mines, Operated by the South Manchuria Railway Company



East Anshan Iron Mines

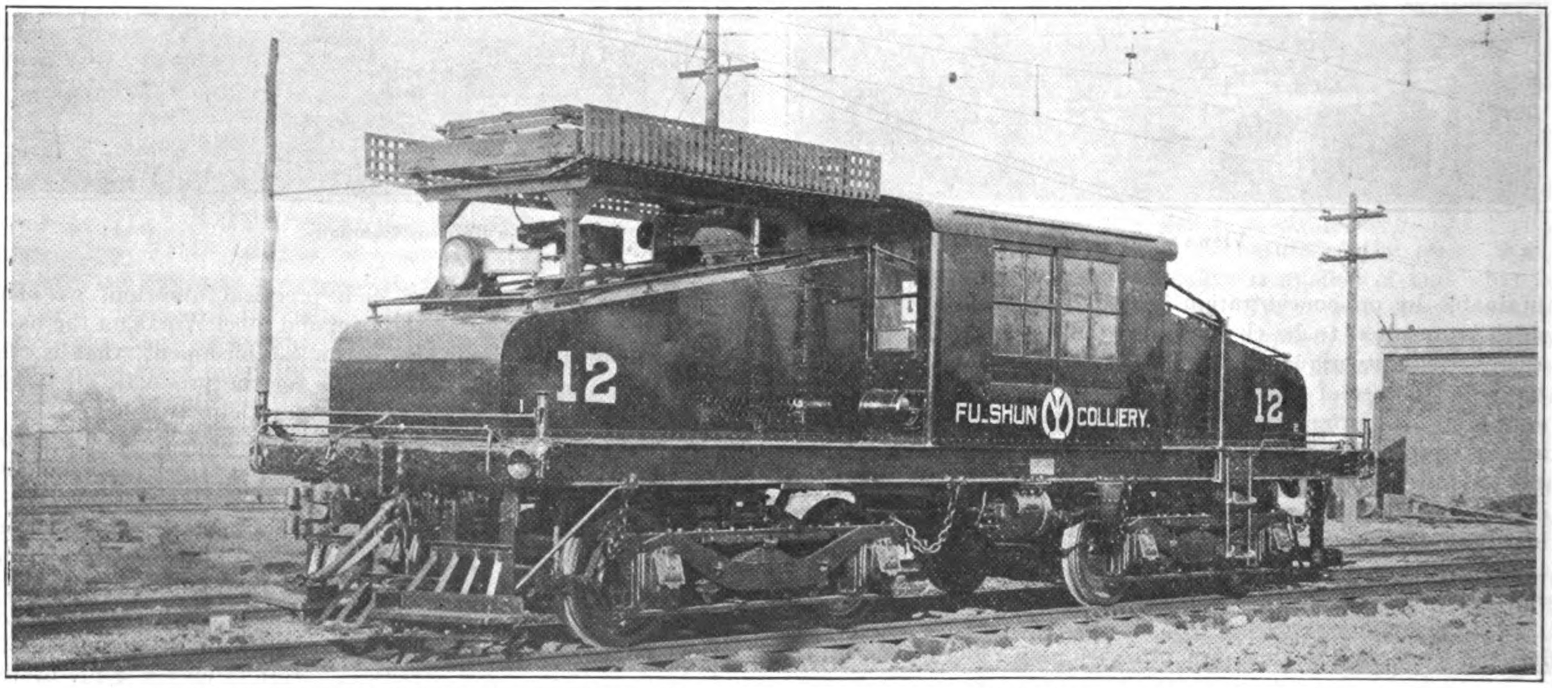


East Anshan Iron Mines

cent. of iron should be used as raw material to be charged into the blast furnaces, the above-mentioned period may be extended to about fifty years. However, the Anzan Iron and Steel Works should not be satisfied with the production of from 150,000 to 200,000 tons a year. By raising the annual output to 500,000 tons, nay even up to 1,000,000 tons, the Works may well be regarded as worth founding.

When such possibilities are considered, the exploitation of Takushan Mine alone will not do. The utilization of the major portion of hematite as raw material by all means would be absolutely necessary for the annual production of 500,000 tons to 1,000,000 tons a year. It is on this account that the problem of the briquetting of hematite assumes a most significant complexion. It is regrettable to say that, with hematite produced at Anhan, no tangible instance of a satisfactorily economical solution has yet been known, nor has the study of the same subject advanced, and therefore it can hardly be said conclusively that it permits of conversion into an artificial rich ore as advantageous as the one to be made from magnetite. Still, what may be done in order to attain this object seems predetermined and it is considered to be quite practicable. For this reason, a proper or adequate study of this problem should be prosecuted and, we are made bold to believe that little stands in the way of getting ready the sufficient raw material for the manufacture of 1,000,000 tons of pig iron a year at some future date. Cokes are made from coal by dry distillation. The coal may be composed chiefly of Fushun coal mixed with suitable amounts of Penchihu or Kaiping coal, and the mixture will put out a coke highly suited to the use of an iron and steel works. We may speak with confidence from the coal reserves of these collieries that their supply will prove quite adequate. Limestone is in less demand than the ore and cokes, and the district, in which the new Works stands, abounds in limestone.

As above stated, there is no reason to fear the shortage of the principal raw materials for the Iron and Steel Works. Seen from its relation to the raw materials only, the Anzan Iron and Steel Works stands in a more favourable position than any of its likes in Japan. Moreover, the very fact of its being located in the midst of the iron ore belt, an efficient raw material may be obtained at a comparatively moderate rate even if some outlay may be required for the ore-concentration. Even now, the iron ore is supplied on very moderate terms. The cost of the iron ore does not amount to 20 per cent. of the production cost of pig iron per ton. Cokes cost dear nowadays, taking up about 40 per cent. of the production cost. This is owing chiefly to the high price of coal. In the iron and steel manufacturing industry, coal forms an important factor having a serious bearing upon the production cost. Consequently, its supply on low terms is essential, and at the same time it must be used in the most effective manner. The quality of an ore is closely related to the quantity of coke to be charged into the blast furnace.



Class 404-E-112-4 G.E. 207-1200 Volt Electric Locomotive, operating at the Fushun Collieries of the South Manchuria Railway

To return, the collieries supplying coal, the primary raw material cannot be said to lie at great distances. Furthermore, these collieries being closely related to the management of the Iron and Steel Works, there are ample facilities available.

The most convenient market for the product is Japan, as may be seen obviously. Supposing that a Steel Works turning out 1,000,000 tons of pig iron a year should exist to-day, the Japanese market can easily digest the annual product. The only question to be considered is the competition with the foreign imports. However, from the point of distance only, the Anshan products are at an advantage, compared with the foreign imports. If the cost of production should not be much dearer, the Anshan manufacture would have fair chances to come out of the competition favorably. But, the present day ability of the Japanese is feared to fall short of directing and manipulating this complex and gigantic enterprise. Furthermore, they are lacking in experience. Naturally, the producing cost will be raised, making the Anshan product placed awkwardly in competing with the foreign imports. Such a state of things cannot be regretted too much. But, it would be too much to expect an easy success by aping the intricate industries of the West, in which the technical geniuses and talents have concentrated their energies on the invention and improvement of these industries, raising them to what they are to-day by paying dear sacrifices and by turning to most account the experiences and discipline acquired by efforts of over a hundred years.

Moreover, under the import tariff now obtaining, it might be likened to a mere boy running a race with a grown up athlete. It could hardly be a race.

The steel manufacturing countries like Great Britain, the United States, Germany, etc., adopted a liberal protective policy for steel manufacture at is early stages, and if Japan wishes to foster the same industry, she ought to follow the example. From this point of view, the question of the market for the products of the Anzan Iron and Steel Works may find a solution.

As stated above, the Anzan Iron and Steel Works has little to concern itself about as to either the supply of the necessary raw materials or the market for the manufactures; it is also feasible for the Works to put out 1,000,000 tons pig iron a year some day. However, as to the practical questions what should be done with the Works and what will become thereof, they remain riddles that will be solved by time only.

Chinese Engineers in Convention

WESTINGHOUSE is not neglecting its future interests in China. The company has opened its factories for the training of Chinese electrical engineers. Their contribution in this direction was emphasized by the delegation of bright young engineers sent from their factory to attend the last joint convention of the Science Society of China and the Chinese Engineering Society of the United States, held last year at Princeton University. These two organizations are made up of Chinese graduates of engineering and scientific schools, their purpose being the furtherance of scientific experiment and learning. Knowing that the future development of their country depends largely upon the advancement of its people in engineering knowledge, Chinese students have seriously pursued these studies in the various colleges of the world. America, while leading in the number of young engineer graduates, has no monopoly in this branch of education, as some of the brightest and most successful of these engineers have been educated in England and the work of the Hongkong University merits great praise. Statistics show that they practically always rank amongst the highest in scholarship.

The convention was a good indication of the serious manner in which these Chinese students in the United States have been pursuing their scientific and engineering work in preparation for solving the industrial problems of their native land. It is largely through such co-operation that the Chinese people gain inspiration for the many scientific and engineering achievements that they are making. The chairman of this convention was Mr. G. Chow of the Westinghouse Electric & Manufacturing Company. The scope of the convention may be judged from the title of some of the papers submitted and the addresses before the convention. Miss A. Lee, speaking on "Scientific Methods of Education," Mr. G. Chow, on "The Electrification of Steel Mills," Mr. Y. G. Chen, submitting a "Thesis on in Chemistry," Mr. Y. T. Yao, on "Historical Development of the Principle of Relativity," Dr. C. H. Hu, on the "New Knowledge of Nutrition" and H. C. Wang, on "Railway Signal and Interlocking."

THE GROUP FROM WESTINGHOUSE
Left to Right: Front Row: C. S. Young, G. Chow, J. K. Chin
Second Row: N. T. Chow, Molin Ho
Rear: T. Nih

A Silk Testing House for Shanghai

Mr. D. E. Douty, of the United States Testing Co., arrived recently in Shanghai, to establish the Shanghai testing house, authorized by the United States Testing Co. Mr. Douty will undertake the preliminary work of instituting American testing methods in the Chinese market.

The latest testing methods and the most modern machinery will be installed in the Shanghai plant.

The co-operation of the Chinese filature operators in the establishment of a testing house was promised during the International Silk Exposition, when a mission headed by Ting Ju Ling visited New York. At the time of the annual meeting of the United States Testing Co., an increase in capitalization was voted, which, when met with financial assistance from the Chinese, assured the success of the institution in New York.

Rice Milling in the Philippines

Modern Rice Threshing Machines at Work in Murcia, Tarlac, P.I.

DUE to the methods of culture and climatic conditions existing in these islands rice was never grown over large areas under one management, as in California and some of the southern states, until lately, when the introduction of tractors has made it possible to plant rice on a big scale. But tractors can in most places only be used for upland rice. It is impossible to use them in planting lowland palay except by following the method used in California; that is, the field is prepared dry and then the seed is drilled in, as in planting corn, and the whole field is flooded. This, of course, can only be done in places where irrigation water is available.

The tractor, however, has partly solved the labor problem arising from the high cost of wages and the scarcity of field hands. It makes possible the planting of a bigger area and in very much shorter time than by using animal power; it eliminates the factor of loss due to rinderpest and enables the farmer to use drilling and harvesting machinery. True, some modern machinery was tried here some years ago, and failed to give good results; but that was because it was drawn by carabaos and bulls while the speed of the machinery was rated according to a horse's walk, which is faster. At that time no tractors were available so that the heavy machines were found to be impracticable. It must be borne in mind, though, that the land used for rice in most places is not extensive enough and the fields are not properly laid out for modern agricultural implements, and the majority of fields are small, irregular strips of land divided from one another by levees or "pilapil" to form small paddies; so the present method of planting lowland rice is such that the use of heavy machines is inadvisable, as for these to be used successfully in these islands the upland method of planting rice would have to be followed exclusively and all the levees destroyed.

One of the most expensive parts of rice production is the harvesting, as this is at present done by hand.

The use of modern machines is impracticable for harvesting rice in the Philippines except for upland rice; and about three-fourths of the rice planted at the present time is lowland. Machines cannot be used in the lowlands unless the dikes are taken away and the soil drained to make it hard enough to support the weight of the machinery. There are several methods of harvesting practiced—one is by cutting off the ripe heads one by one, or at the most three at a time, with an implement called a "pangani" or "yatab." This is generally used by women and children for harvesting upland or bearded palay. Sometimes the heads are cut off separately and tied together in large bundles called "manojos" weighing about ten kilos each. These are placed in the sun until dry and are then put in the house. As a rule only bearded varieties are harvested in this way, unless the fields are under water or the heads have become so tangled together that the crop cannot be cut by the other method. The second most common method is to cut the straw about midway between the ground and the head with a kind of sickle or serrated knife fastened in the back of a crooked branch of a tree and having a hook at the end for gathering the straw into a bunch. This is known as a "lingcao." The hook is held in the right hand; with it the rice is pulled up and grasped by the left hand, the hook is then loosened and the straw cut with the knife fastened at the back of the hook, and tied into bundles about 10 to 15 centimeters in diameter. The bundles are called "ha-ya," by the Tagalogs. They are so uniform that they are used

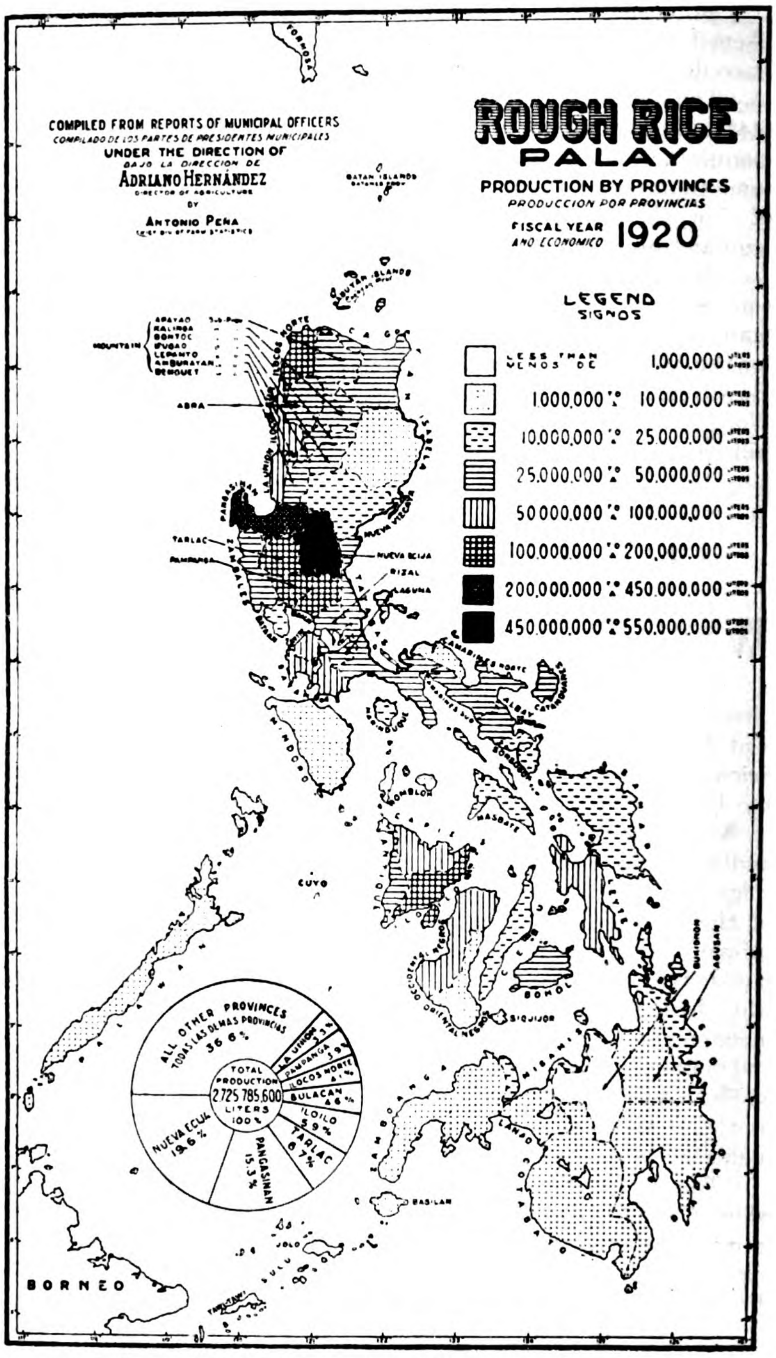
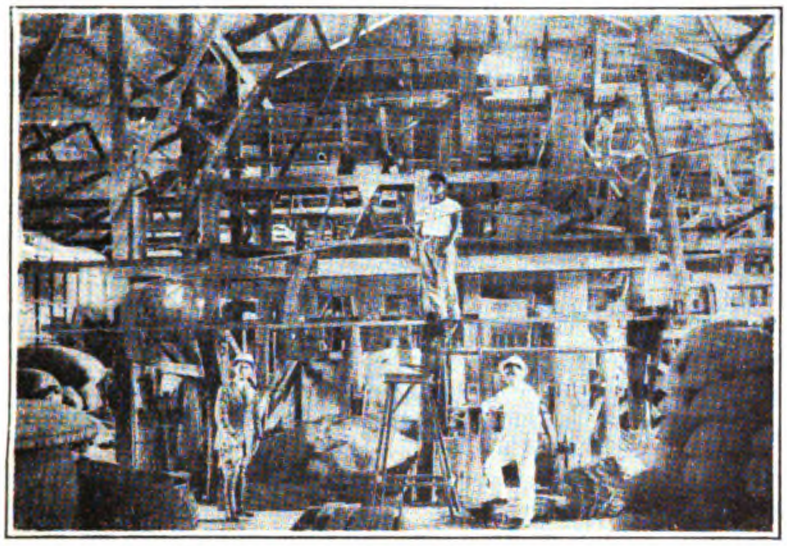


Chart Showing the Relative Production of Rice in each Province of the P.I.

sometimes as a unit of measure, each containing about 0.3 kilo of threshed grain. These are left scattered on the ground to dry until well cured. They are then piled in shocks on the dikes until the harvest is over, when they are hauled to the stack yard and stacked. This method is generally used by the Tagalogs, it being



Interior View of a Rice Mill in Binacayan, Cavite, P.I.

the most practicable. Making a communal job of planting or harvesting where there are many small holdings is more or less a common practice in many provinces, but on big rice farms it is the custom to harvest on the share system, amounts varying from one-tenth to one-fourth of the crop being given to the harvesters and sometimes even one-half when hands are scarce. By this system of harvesting, a skilled harvester sometimes gets several cavans as his share for a few days' work.

In some places, harvesters are paid from P.0.20 to P.0.50 with the privilege of carrying away as much rice as they can carry; but in others the harvesters are paid regular wages from P.0.60 to P.1.50 a day. Whenever it becomes possible to use a reaper and binder, the cost of harvesting, the greatest expense, will be much reduced. And furthermore much time will be saved, as one of these machines pulled by animals can reap about five hectares a day.

Threshing

Several hundred modern threshing machines are now being used by some of the big rice planters in the Philippines. At present most of them are found in Nueva Ecija, Bulacan and Pangasinan. These machines move from place to place to thresh rice and payment for the work is made either in money or palay. Small farmers thresh their rice immediately after harvest, usually stacking the harvested crop and do it in so excellent a manner that it is not injured by rain. These stacks are allowed to remain for a month or so until it is full moon or until the weather becomes settled. Threshing is still done in most places by various simple means such as treading out the grain on a hard earthen floor by human beings or carabaos, treading on slatted platforms and beating with flails against stones or hard wooden boards.

Rice sheaves are spread on the threshing floor and the grain is trodden out by animals driven in a circle. Generally carabaos or horses are used for this kind of work. The animals go on until virtually all the grain is threshed—the small quantity left in the panicles is cleaned by hand or by the laborers' feet. Threshing in this manner is generally done by moonlight. Sometimes a wooden roller with short teeth or spikes is driven over the sheaves and as many as 20 carabaos or horses are used at one time—the more animals there are the quicker the work can be done. Fifteen carabaos or horses when used at one time can easily thresh about 200 cavans of palay in five hours.

When labor and animal power is cheap it is better to thresh rice in this way as the chances for weed contamination, seed mixing, and breaking of the kernels is less than it would be by machinery, as very often there is faulty adjustment of the parts of the machine. One carabao can thresh about 15 cavans of palay in about five hours. Especially when rice is wanted for seed, the threshing machine is not to be recommended, unless perfectly adjusted. Generally from one-tenth to one-sixth of the palay cleaned is given a man as his share for threshing and about one-tenth is given when threshed machine is used.

Rice should not be threshed until the kernel is hard and the straw thoroughly dry and cured. It can be properly cured in a well piled shock, even though exposed to heavy rains and the hot sun. When straw, however, is stacked while damp or green the seed will heat and lose its vitality and produce a soft chalky rice which sells at a low price.

Cleaning

There are two methods of cleaning rice practiced. Poor farmers pound it in a large wooden mortar with a wooden pestle called a "mazo." The first pounding takes off the hull and further pounding removes the bran and germs. Then the hull and rice polish are removed from the kernel by winnowing. For this purpose, a native fanning mill called "hungkoy" is used. The process is rather slow and expensive so that this method is only used when rice is intended for home consumption or when the place is far from a mill. Rice so cleaned, however, does not receive as high a polish as that cleaned in large mills and costs more on the general market, mainly on account of the extra labor it takes to clean rice in this way. This kind of rice, however, furnishes a better ration than highly polished rice, as it contains more protein and phosphorus. It has been found that those who live upon an

Water Power Rice Mill in Lucban, Tayabas, P.I.

almost exclusive diet of polished rice are subject to a disease called "beriberi." It is supposed that this disease is due to the absence of phosphoric acid anhydride, which is essential to human life. The unpolished rice contains three and three-tenths per cent. more phosphoric acid anhydride than the polished.

Rice Mills

Modern rice mills are gradually superseding the old-fashioned sort and are very common nowadays, especially in the rice provinces, generally along the railroad stations. There are also some water-power mills, most of which are found in Cavite, Laguna and Tayabas. At present there are several hundred small mills requiring engines of 6 or 8 horse-power to operate, which clean rice for local use. They charge, as a rule, from 20 to 50 centavos for cleaning each cavan of rice, while other mills receive only the by-products as payment for the work.

The rice grain in the hull as it is received in the mill is termed "rough rice" or "palay." The process of milling or hulling consists of three steps. In the first the hull is removed; in the second the outer coating; and in the third the inner one. The palay goes between a pair of grinding stones, set some distance apart, which revolve, causing the grains to assume a slanting position. While in this position pressure is exerted at the ends of the grain, which cracks or splits the hull and the kernels drop out. The mill is adjusted in such a way as to prevent too much breakage of the kernel, as broken rice sells for less. After leaving the hullers the rice is screened and fanned, to free it from the bran, broken rice or "binlid" and hull. In the United States and some other countries the kernel is polished thoroughly to give it the luster that is demanded by the market. In Spain and the United States glucose and glycerine are used for polishing.

Maritime Customs' Reports

Canton's Progress

THE construction of the first-term main roads was completed in July, and the survey for the second-term roads has been carried out and parts of these works are also well under way. Lack of funds, however, has called a temporary halt to these much-needed improvements, and the autumn troubles have further helped to impede progress. It is, however, certain that Canton means to be a modern city, and to those who have been residents there for many years the changes are very startling though very welcome.—Police records give the number of motor-cars as 94; and the Kwangtung Tramway Company, while awaiting fulfilment of orders for rails from America, has started its street service with six motor omnibuses.—The Kwangtung Electric Supply Company's new turbine plant has been fully installed, but the intake power-house on the river front has yet to be completed.—During the year the Canton Waterworks laid 1,533 feet of additional mains and 163,785 feet of new pipes. Income, however, only reached $15,000 for the year, and the company is reported to have lost about double that amount, owing to the increased use of fuel and the depreciation in Bank of China paper currency.—Two new match factories have been established during the year: one in Wongsha suburb, known as the 廣東火柴公司, and the other at Yimpo (鹽步), some 13 *li* from Canton, and styled the Man Sang Factory (民生火柴廠). Exports of matches extend as far as the Straits Settlements, and the substitution of locally split wood for the Japanese imported article has proved very satisfactory.—The conclusion of the great war was a hard blow to mining enterprise in Kwangtung province. A few mines have therefore closed down, and antimony ore, which gave 3,500 piculs in 1918, has fallen to 683 piculs only for 1920. The production of native coal also shows a marked shrinkage. The moderate cost of Japan coal and transport difficulties in the interior causing disproportionate expenditure, together with an advance of 100 per cent. in the importations of Kaiping coal, are the reasons assigned.—Canton has now five large factories and several hundred workshops for producing socks and underwear, the trade in which is flourishing, owing to the high price of the foreign-made article.—An innovation worthy of note as a sign of the times is the employment of female labor in other lines than as teachers and factory hands. The position of clerk in the railway administrations is one form of advancement for them, and several are employed as secretaries in the house of parliament and the senate. A further opening for girl graduates is the telephone exchange station, where plans are being made to introduce female employment.

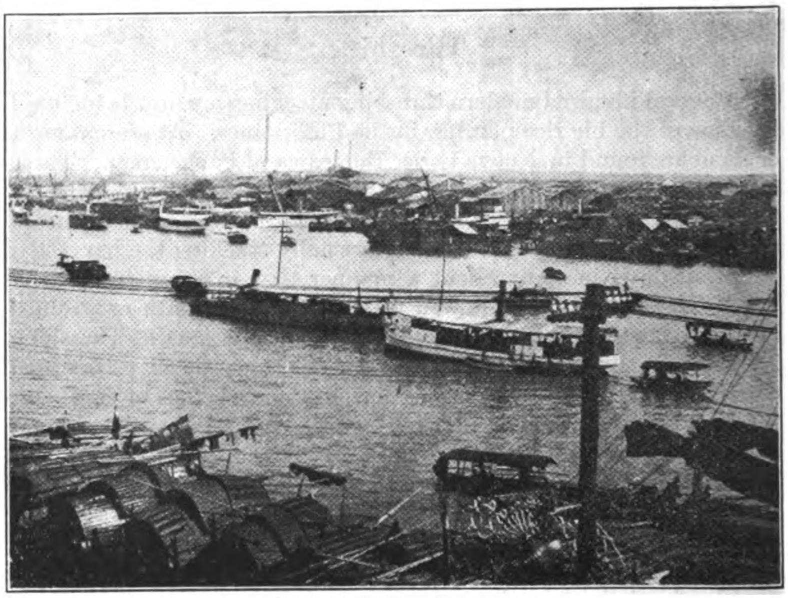
Much has been done during the year in the development of home industries. New factories have sprung up like mushrooms, and many more are in course of erection. At Honam an up-to-date cotton-yarn-spinning factory is nearing completion. Machinery of the very latest pattern is to be installed, and when completed and in full working order sufficient yarn, it is anticipated, will be produced to meet local demands and requirements. The company has been promoted locally, with a capital of five million dollars. A foundry, supplied with up-to-date machinery, for the manufacture of copper sheathing from ore mined in the province, is in full working order, with satisfactory results. Boat-building has also received an impetus by the formation of a company with modern plant. It is estimated that 100 boats of various sizes can and will be turned out in a year.

Kongmoon Activities

The Sunning Railway continued its operations successfully throughout the year, and the hazardous nature of transport by water is reflected in the increased number of passengers carried by this route. The rolling-stock and track, however, are in a bad state and will require a considerable outlay of capital if continued success is to be the lot of the company. A branch line was opened in November from Sunning city (新甯) to Paksha (白沙). The proposed extension to Yeungkong is still under contemplation, and it is doubtful if funds will permit of work being commenced in the near future. When completed, the company hopes to earn a large profit from the conveyance of freight as well as from the movement of passengers. Part of the capital at least for the motor road from Sunwui to Kongmoon and thence to Pakkai has been subscribed and the route roughly surveyed, while Chinese engineers have been engaged for the construction of the necessary bridgework in the section between Sunwui and Kongchow. It is anticipated that work will commence shortly.—Aeroplanes made their first appearance in the district, the Italian aviator Ferrarin, *en route* from Rome to Tokio *via* Hanoi and Canton, landing at the lonely out-station of Gaemoon (崖門) on the evening of 21st April. The machine left again the next morning, passing over Kongmoon some 15 minutes later.—The Kongmoon Paper Mill has driven a thriving trade throughout the year, and, as the only foreign-type factory in the district, its continued success must be most gratifying to its enterprising owners.

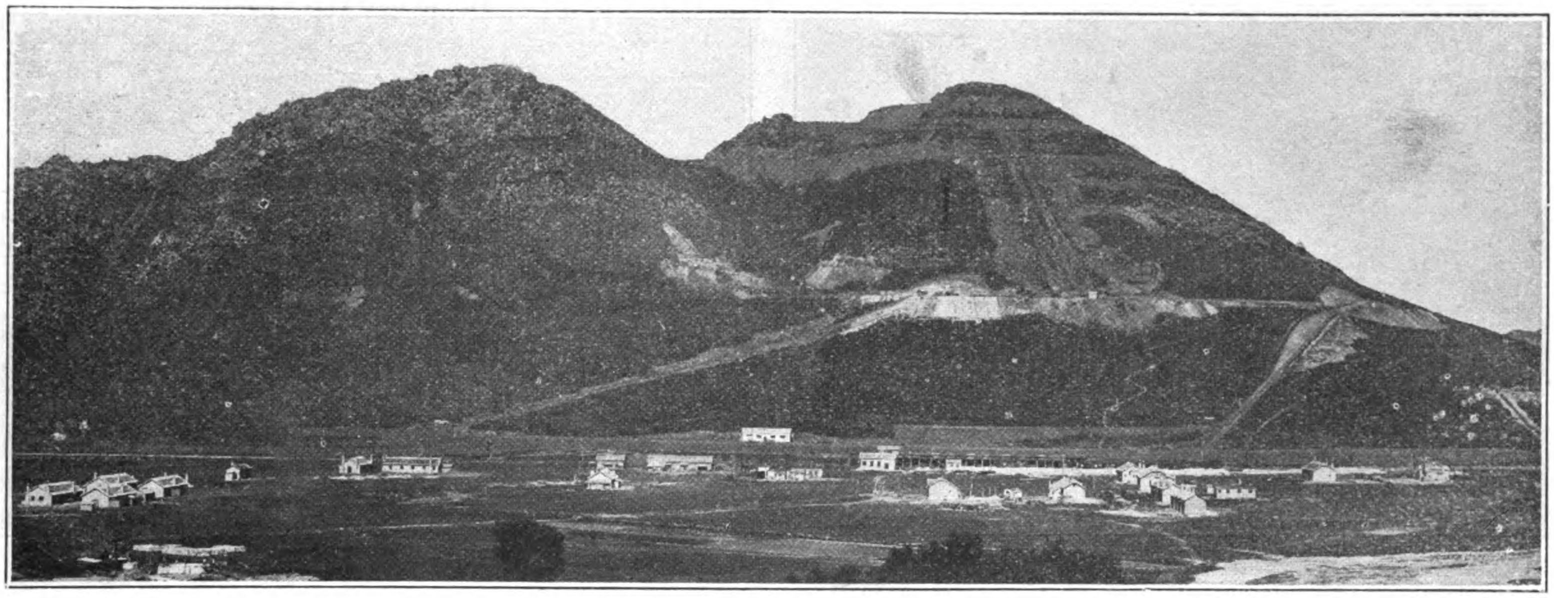
Harbor Scheme at Lappa

In January the harbor improvement scheme was taken in hand under the direction of Admiral Lacerda. The work, which is to cost some $10,000,000, embraces a breakwater to enclose a new



The River at Canton

harbor accommodating vessels drawing up to 22 feet, an inner harbor, near Green Island, for native craft and shipbuilding slips; and spacious wharves, piers and godowns. The breakwater and seawalls are expected to be finished within three and a half years, and the whole scheme completed in eight years.



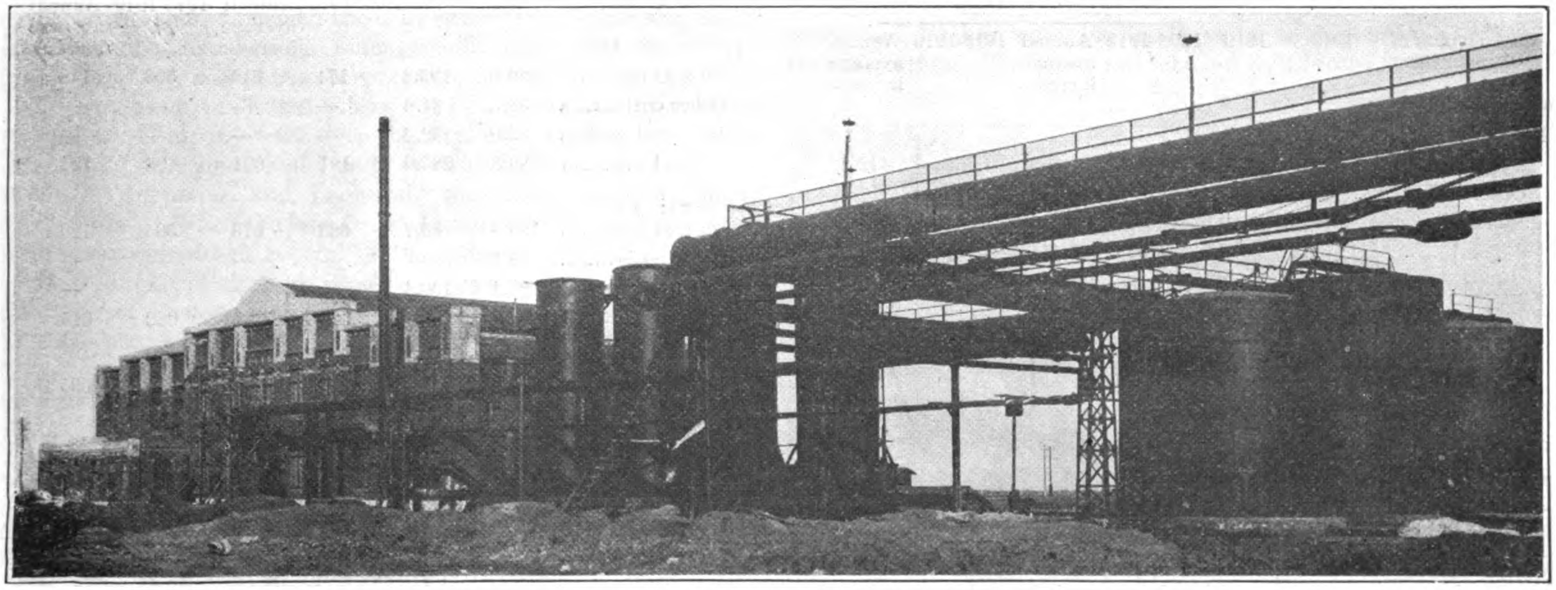
Anzan Iron Mines, The Ta Ku Shan Workings

Fushun Colliery Development

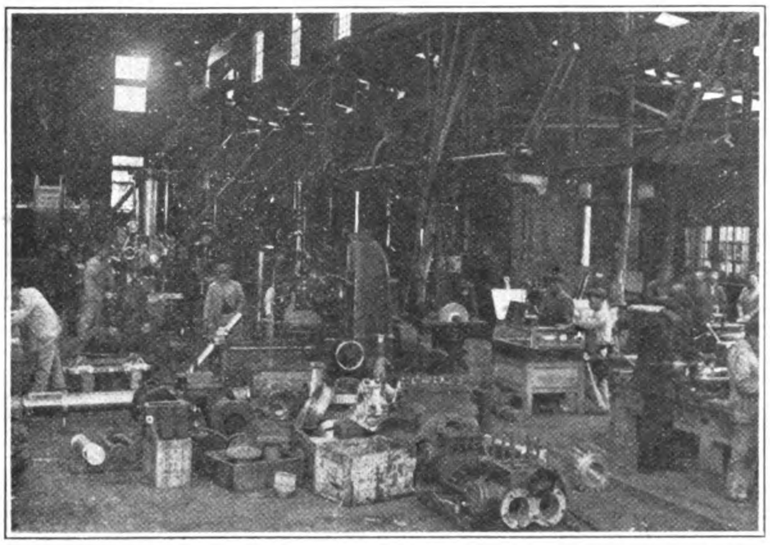
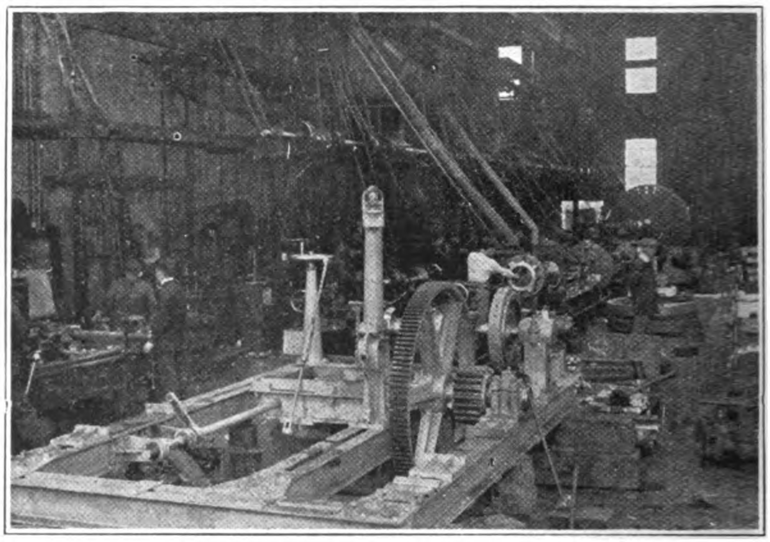
American Experts Arrive

IN order to carry out its latest ten-year program for the development of the Fushun Collieries and the Anshan Steel Works, the South Manchuria Railway Company is now engaged in carrying out most exhaustive investigations, and to this end, Viscount T. Inouye (acting general superintendent of the Fushun Mines and Anshan Steel Works) recently made a visit to the United States and there engaged the services of several prominent specialists. Amongst these are Professor W. R. Appleby, dean of the School of Mines of the University of Minnesota, Prof. W. H. Emmons, head of the department of geology and minerology of the same University, Prof. Mead, a geologist of the University of Wisconsin, Mr. Davenport, ex-chief of the mining department of the American Steel Corporation, Mr. Charge, assistant chief of the coal mining department and Mr. Hutchinson, another engineer of the same corporation. This party is to make exhaustive studies and investigations for the proper development of the low-grade Anshan iron ores, in addition to devising extensions to the Fushun coal mines and a plant for the extraction of petroleum from shale and coal. A large part of the expenditures to be made by the S.M.R. Company during the next four years, estimated at $200,000,000 gold, is to be inverted into improvements and extensions to the coal and iron mines.

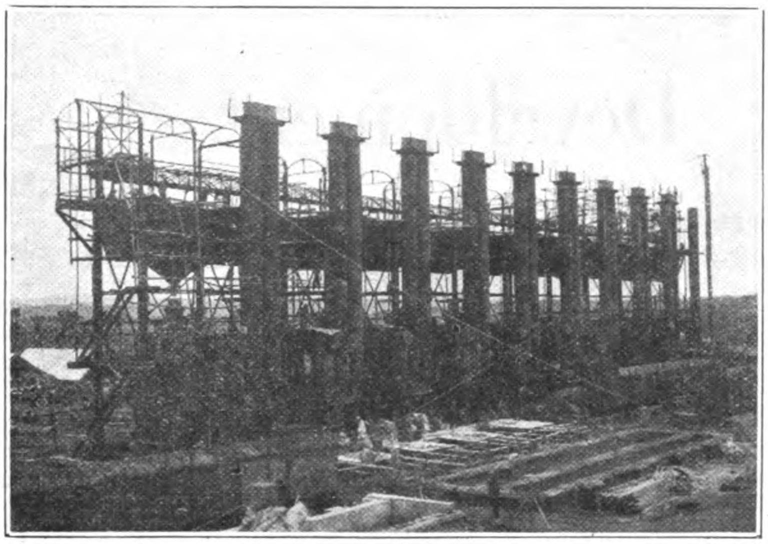
The Fushun Collieries have been often described in the pages of THE FAR EASTERN REVIEW, but we present herewith some up-to-date information on the coal and iron mines extracted from a papers by Mr. S. Otsuru and K. Wada written for the *Light of Manchuria* the official organ of the South Manchuria Railway Company.



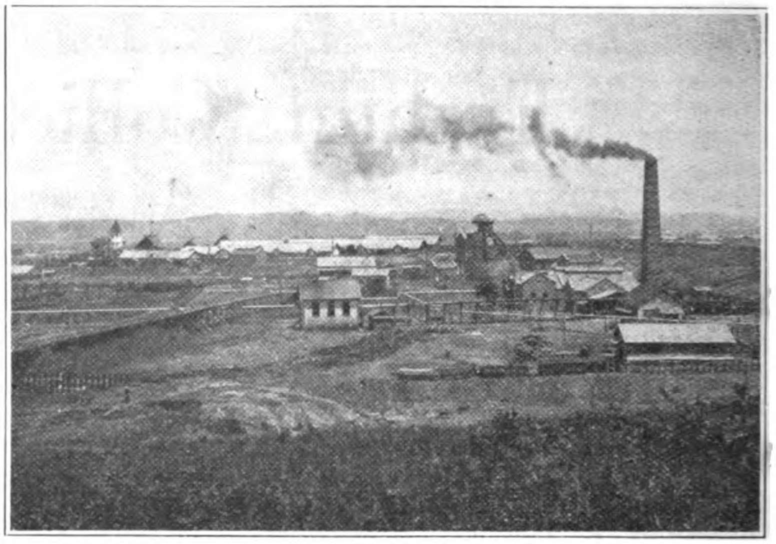
Sulphate of Ammonia Factory, Anzan, South Manchuria

INTERIOR OF MACHINE SHOPS



Gas Producers



Chienchintai Pit

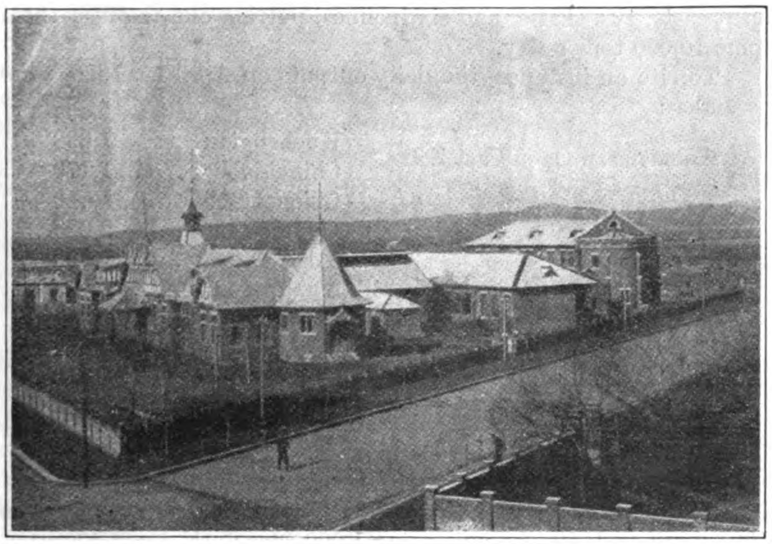
VIEWS OF THE SOUTH MANCHURIA RAILWAY COMPANY'S FUSHUN COLLIERIES

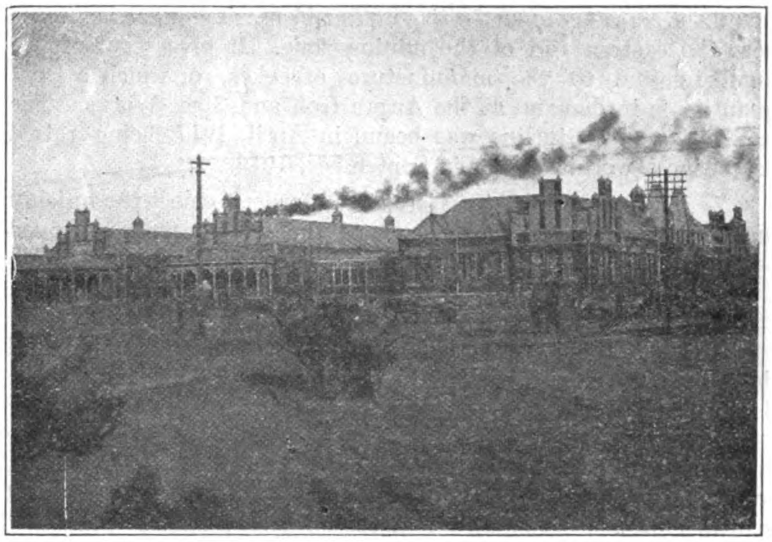
Unit : 1,000 tons.

Coal outputs of Manchuria	1918	1919	Rates of Increase 1908-1919	Annual average increase	1915-1919	Annual average increase
Demands:						
For use of S. M. R. Co. —						
Fushun coal	865.8	1,340.2	3,678	408	1,768	442
Other coals	158.2	111.4		—		—
Imported coals...	8.4	166.8	—	—	—	—
Total............	1,032.4	1,618.5	3,995	444	1,799	449
Local sales:						
Fushun coal	900.2	1,012.2	2,364	262	638	159
Other coals	526.3	593.1	—	—	—	—
Imported coals...	—	164.9	—	—	—	—
Total............	1,446.5	1,770.4	4,100	455	1,023	255
Exports:						
To Chosen —						
Fushun coal	397.9	156.2	1,197	133	369	092
Other coals	3.2	0.3		—		—
Imported coals...	55.9	59.8	—	—	—	—
Total............	457.2	216.3	1,480	164	140	035

To Abroad	1918	1919	Rates of Increase 1908-1919	Annual average increase	1915-1919	Annual average increase
Fushun coal	339.6	195.8	174	019	593	148
Other coals	38.8	34.6	—			—
Imported coals...	2.0	52.4		—	—	—
Total............	380.5	283.0	191	021	496	124
Bunkers:						
Fushun coal	135.9	83.7	685	076	505	126
Other coals	3.1	—			—	—
Imported coals...	93.1	100.4	—	—	—	—
Total............	232.3	184.2	2,550	282	062	015
Grand Total Bunkers:						
Fushun coal	2,639.6	2,788.2	1,947	216	381	095
Other coals	729.9	739.6	—	—	—	
Imported coals...	159.6	544.6	—	—	—	—
Grand Total ...	3,529.1	4.072.5	2,882	322	653	163

BRIEF HISTORY.—Coal mining at Fushun dates from 600 to 700 years back when, in the Liao Chin reign, a number of Koreans came to Fushun to mine coal for the manufacture of pottery.





Fushun Collieries: School House and Hospital

Subsequently, the Moguls rose and fell. Under the Manchu dynasty, the mining work was prohibited on account of the proximity of Fushun to the tombs of the imperial ancestors. The Peking (Manchu) government, awakening to the profit of mining the coal, withdrew the ban in 1901 and gave permission to some Chinese to operate the collieries.

It was in about 1903 that the Russians, who were then in the ascendancy in North and South Manchuria began to cast longing eyes upon the Fushun Collieries. They started to invest capital in the management of the mines. In 1904, they constructed a railway and subsequently opened hostilities with Japan. On March 10, 1905, the Japanese army, which was on that day in the very thick of the successful battle of Mukden, took possession of the Fushun Collieries. The army opened a mining office and soon afterwards set about a semblance of an organized mining under the directions of the mining corps of the Japanese field railway paymasters' department.

South Manchuria Railway Company.—On April, 1907, on which date the South Manchuria Railway Company took over management of the railways ceded to Japan by Russia, which have been styled the South Manchuria Railway Lines, the Railway Company also assumed management of the collieries at Fushun, Yentai and Chatzuyao, and in July of the same year, the two minor collieries at Taochiatun and Shihpeiling were taken over also from Russia in terms of the Russo-Japanese Railway Agreement.

Of the above-mentioned collieries, both Fushun and Yentai have lain under management of the South Manchuria Railway Company and the Chatzuyao colliery (in fact an insignificant ore) of a private Japanese ; whilst the collieries at Taochiatun and Shihpeiling were entrusted to the management of the Souh Manchuria Mining Co., Ltd., a Japanese corporation, in 1918.

First Stage of Fushun Mining Plan.—At the time when the Railway Company took over the Fushun Collieries, they were worked only on a small scale, and between the three pits at Chienchinchai, Yangpaipu and Laohutai, the daily outputs totaled only 360 tons. When the late Dr. B. Matsuda took up his duties as the first superintendent general of the collieries, the energetic and experienced expert drafted what is known as the plan for the first stage of Fushun coal mining estimated to cost Y.9,200,000. The same plan had as one of its prominent features the excavation of two extensive shafts at Chienchinchai and Yangpaipu. The two shafts were completed in 1911 and were respectively named Oyama and Togo pits. Sundry improvements were introduced in other directions, and the daily outputs were raised to 5,000 tons.

Second Stage of Fushun Mining Plan.—The second stage of Fushun mining plan was entered upon. On the death of Dr. Matsuda (the successful organizer and first manager of the collieries) in 1911, Dr. S. Yonekura succeeded the deceased in July of the same year.

The chief items of enterprises carried out during this stage were as follow :

1. Completion of excavation of an incline at Wantawu (commenced in April, 1914, and opened to operation in April, 1915).

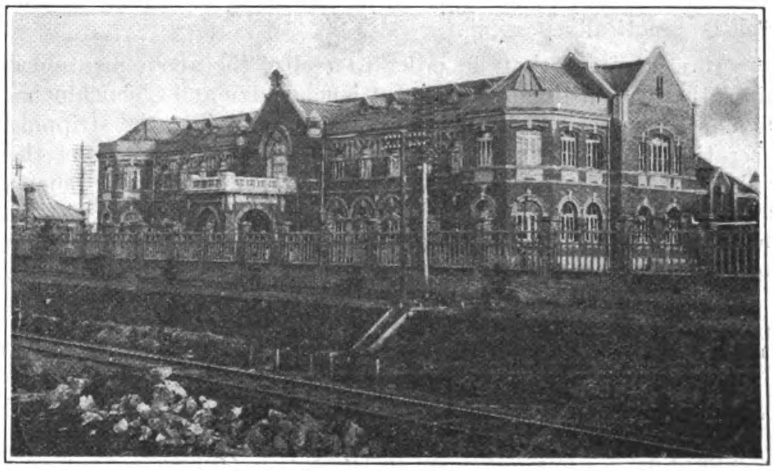
2. *Open Cast at Kuchengtzu.*—As already mentioned, owing to the unparalleled thickness of the Fushun coal seam, the most commendable plan of mining is to work the portion at comparatively shallow depths on the open cast system and the rest at greater depths on the sand-flushing system.

The coal seam about Kuchengtzu is located at the western edge of the coal belt and is 400-ft. thick, and only 40-ft. from the surface of ground. On this account, it was decided to be operated on the open cast system. Work was begun in April, 1914, and was opened to business working in April, 1915.

3. Sand-flushing method was introduced first into Yangpaipu pit in 1912, and was extended to Oyama, Togo, Laohutai and Chienchinchai pits.

4. *Construction of Mond Gas Producers' Plant.*—Since Fushun coal contains a comparatively large percentage of nitrogen (the percentage ranging from 1.3 to 2.9 per cent.), it was planned to extract the nitrogen for the manufacture of sulphate of ammonia, besides procuring such bye-products as pitch, tar, naphthaline, etc., with the object of bringing down the expenses for the motive power. Consequently, the Mond gas producers' plant was founded, it being completed in March, 1915.

5. *Coal-carrying Sidings and Electrization of Sand-gathering Sidings.*—Both coal-carrying and sand-gathering railway sidings at and about Fushun were electrized so as to expedite the work of transportation. The work was effected by October, 1914.



Head Office of the Fushun Colliery

6. *Excavation of an Incline at Lungfeng.*—Lungfeng is located near the eastern end of the mining zone. It gives coal of fine quality suited to the manufacture of cokes, of which a large quantity is in demand at the Anzan Iron and Steel Works. The excavation of an incline was begun in April, 1917, being raised to business working order in September, 1919.

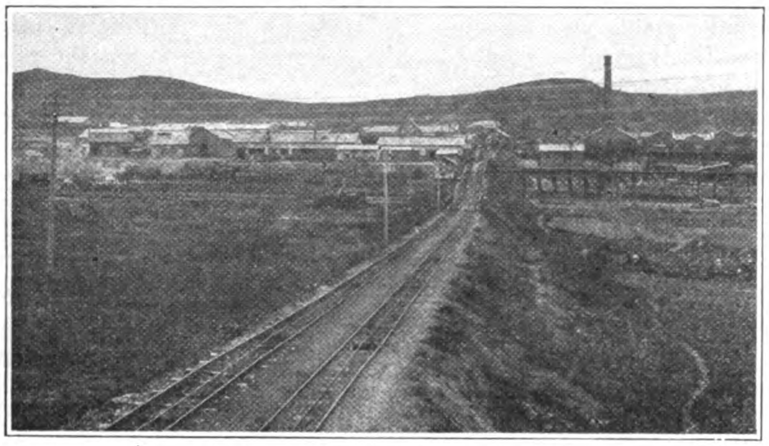
7. *Open Cast at Chienchinchai.*—In order to meet the quickly increasing demand in consequence of the great war, a new open cast was initiated at the west of the Chienchinchai pit.

8. The excavation of another incline was started in May, 1918. It was opened to business working in April, 1920.

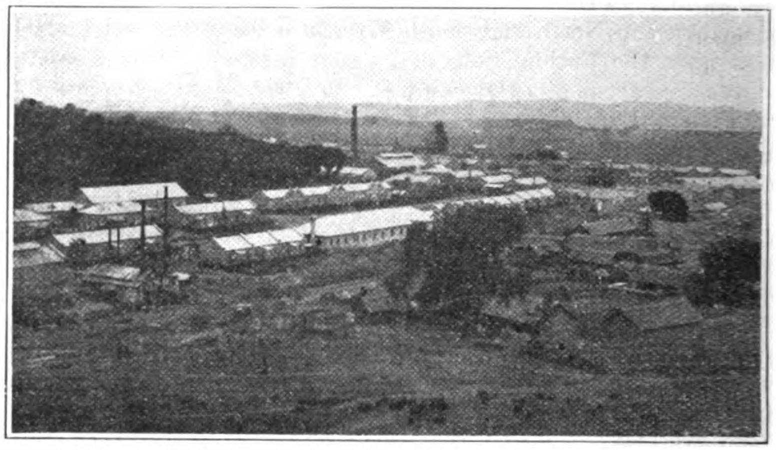
Through the introduction of all these enterprises, the total daily outputs were increased to about 7,000 tons a day by the fiscal year 1918.

THIRD STAGE OF FUSHUN MINING PLAN.—The great war inflated also the economic activities in Manchuria and Chosen, substantially increasing the population. Many fresh industrial ventures were launched afresh in these regions, making it impossible for Manchurian coals to fill the rapidly rising requirements. To make up for the shortage, it was necessary to import 150,000 tons of coal in the fiscal year 1918 and 490,000 tons in the following fiscal year, 1919.

The possible increase of demand in Manchuria and Chosen, particularly by the Anzan Iron and Steel Works, had to be considered, and under these circumstances, what is designated as the ten-year program was drawn up in 1919.



Fushun Collieries: Yanpuipu Pit



Lanhutai Pit

On the resignation of Dr. S. Yonekura (superintendent-general of the collieries) at the end of 1919, Viscount T. Inouye (professor of the Imperial University, Tokyo) succeeded him as acting superintendent-general, additionally holding the superintendency-general of the Anzan Iron and Steel Works.

The ultimate object of the ten-year program lies in contriving a quick increase of the output so as to meet all possible contingencies and in effecting as much saving of mining cost as well be practically possible.

It was agreed that, in order to realize the above-mentioned aims, the two existing open casts at Kuchengtzu and Chienchinchai should be connected and operated as one, and that the stripping operation should be extended further to the present site of the railway town of Chienchinchai, that three new extensive shafts should be excavated, so that by 1929 the annual outputs may be increased to 8,000,000 tons (inclusive of 3,400,000 tons from the open cast, which will be 46 per cent. of the total yield), and that twenty years hence, that is, by 1939, the annual total may be increased to 11,000,000 tons.

The first steps taken in the above direction are the extension of the Chienchinchai open cast and the excavation of the Lungfeng pit.

PRODUCING CAPACITY OF FUSHUN COLLIERIES.—As above stated, the Fushun Collieries are being operated by means of two open casts, two shafts, and six inclines, putting out amongst them some 10,000 tons a day.

To cite an instance, the daily outputs on April 14, 1920, were as under :

		Tons
Kuchengtzu Open Cast Zone ...	Kuchengtzu ...	1,638
	Chinchinchai ...	1,179
Oyama Mining Zone	Chienchinchai...	1,519
	Oyama ...	2,033
Togo Mining Zone	Togo	999
	Yangpaipu ...	1,693
Laohutai Mining Zone ...	Laohutai ...	1,344
	Wantawu ...	684
Lungfeng Mining Zone ...	Lungfeng ...	516
	Hsintun ...	135
	Total... ...	11,742

The following gives the annual outputs of the different pits from 1907 down to 1919, the unit being 1,000 tons :—

	Open Cast No. 1	Open Cast No. 2	Chienchin-chai	Oyama	Togo
1907... ...	—	—	103.3	—	—
1908... ...	—	—	238.8	—	—
1909... ...	—	—	324.1	0.1	—
1910... ...	—	—	370.4	14.4	17.4
1911... ...	—	—	404.9	186.4	146.6
1912... ...	—	—	384.8	359.9	252.0
1913... ...	—	—	579.5	421.1	414.9
1914... ...	2.1	—	683.6	235.0	472.2
1915... ...	102.7	—	623.1	301.6	430.4
1916... ...	173.5	—	572.3	305.2	170.8
1917... ...	272.3	0.2	602.7	135.7	291.4
1918... ...	260.7	66.8	486.0	328.2	319.5
1919... ...	231.3	300.4	307.6	406.4	319.5

	Yangpaipu	Laohutai	Wantawu	Hsiutun	Lungfeng	Total
1907... ...	64.5	65.5	—	—	—	233.3
1908... ...	127.3	124.6	—	—	—	490.7
1909... ...	176.1	192.7	—	—	—	693.2
1910... ...	217.8	279.0	—	—	—	899.2
1911... ...	301.6	285.0	—	—	—	1,324.5
1912... ...	219.2	261.5	—	—	—	1,471.1
1913... ...	290.7	473.0	—	—	—	2,179.2
1914... ...	381.8	420.1	—	—	—	2,149.8
1915... ...	471.8	179.4	53.4	—	—	2,162.6
1916... ...	499.1	257.8	65.6	—	—	2,044.4
1917... ...	598.0	295.5	110.7	—	5.1	2,311.4
1918... ...	501.5	393.7	157.0	—	74.5	2,521.2
1919... ...	454.7	405.0	164.7	18.1	155.2	2,762.7
Grand total...						21,242.3

Location Topography, and Geology of Fushun Collieries.—Fushun Collieries are located at about 23 miles east of Mukden, and Chienchinchai in the western part of the Fushun coal belt is situate at 33 miles northeast of Sushiatun junction at which the branch line to Fushun Collieries deviates from the main line of the South Manchuria Railway Lines. At Chienchichai, the colliery town is located. More correctly speaking, the central location post in front of the general offices of the Fushun Collieries stands at 41° 58′ N.L. and 124° 6′ E.L. and above 276-ft. above the sea-level. It is 266 miles distant to Dairen, 193 miles to Antung, and 202 miles to Yingkou (Newchwang).

Colliery Town of Fushun.—Dr. S. Yoshino (professor of the Imperial University, Tokyo) is said to have once remarked that the Fushun colliery town is a miniature of the town of Jena. Since it is the colliery town, the colliery offices and the residences of the Company's officials and employees, together with the primary school, the colliery hospital, the colliery club, the assembly hall, the colliery library, etc., make up the principal buildings. In recent years, stores and shops of different kinds have been opened, but not a street is remarkable for dense traffic. Each street has a vehicular road with a sidewalk on each side lined with shade trees such as acacias, poplars, elms, etc.

In early summer, when these shade trees wear a verdant foliage, through which glimpses of red brick buildings may be caught, and the sweet scent of the white acacia flowers fills the streets, even the crude colliery town lends itself some charming air which may appeal to visitors.

The River Hun has its head among the mountains near Hsingking situated to the east of Fushun. For some fifty miles or so, it gathers petty tributaries and run down the narrow defiles and gorges. The valley considerably gains in size rather abruptly near Tachiapang situated about ten miles east of Chienchinchai. At that point it is about three and a half miles in width, still further expanding as it goes west, connecting with the great plain about Mukden.

Fushun Mining Zone.—The Fushun mining zones lie in this valley, stretching from east to west on the south bank of the Hun River. On the east of the mining zone runs the Tungchou River, a tributary of the Hun, and on the west the Kuchengtzu, another tributary of the Hün. The mining zone is about ten miles from east to west and about two miles from north to south.

From the top of Senkindai (an eminence rising on the south of the colliery town) one may command a fine view of the Hun Valley. In the east, a range of hills is seen undulating and zigzagging. This range of hills marks the southern boundary of the Fushun mining zone. Near Laohutai in the centre of the mining zone, the same range sharply takes a northern direction. This geological feature was caused by the extensive fault running from north to south. This same range may be likened to a pillow for the great coal seam. These hills are constituted of basalt wholly, and on the north side, facing the Hun River, the coal seam has the uniform dip of about 30°.

The enormous coal hoard estimated at 1,000,000,000 tons lay quiet and unnoticed on the bed of basalt, covered with layers of rocky formations. Thus the hoard had lain dormant for billions of years, until the outcrops showing above ground at several points betrayed at length the existence of the subterranean wealth and led to human exploitation. The geological structure of Fushun and environs is composed of hornblende gneiss, which bears a resemblance to both ignious rock and sedimentaryrock, is supposed to have been formed on the "second day of the creation." In the tertiary period of the Cainozoic Era, such layers as those of tuff, sandstone, conglomerate, and shale are supposed to have been brought into existence, and the district is supposed to have been turned into a lake. The lower structure has a couple of thin coal layers running one over the other through it. These layers are called the lower coal-bearing series, the upper 20-ft. thick and the lower only 2-ft. thick, being from several feet to dozens of feet apart. There are traces of the upper layer having been mined from olden times, and such minor mines as Piaoerh Colliery, Hsiaopiao Colliery, Huasheng Colliery, and a few others are being worked upon this layer. The geological layers were organized one after another in the above-mentioned order, completing the earth's crust. Animal life became propagated steadily. The mammals, in particular, were developed wonderfully. In the mean time, the volcanoes were active, and about Fushun, too, there occurred volcanic eruptions, pouring out lava and turning the country into a veritable hell. It was this lava that became basalt, which overlaps the lower coal measures. Again, pozzuolana settled down into tuff.

These layers were overlapped in turn by others of shale and sandstone, and then in the course of millions of years, the herbage, driftwood, fallen trees, etc., were heaped and buried under ground. Under the high pressure and strong heat, they became completely carbonized, thus the principal coal layers of the Fushun coal seam, which has no parallel in the world in point of thickness, came to be formed.

Fushun Coal Layers.—The Fushun coal seam is 78-ft. thick near Lungfeng pit, inclusive of 31-ft. of parting, where it is the thinnest, while directly underneath the colliery town of Chienchinchai, where the seam is the thickest, it is 426-ft. in thickness, inclusive of 19-ft. of parting. The mean thickness of 150-ft. (inclusive of 20-ft. of parting) is found at Laohutai. The contrast with the coal seams in Great Britain, the United States and Germany, which range from only 2 to 10-ft. in thickness, is indeed striking.

Oil Shale.—Over the coal seam, a layer of shale of brownish color, about 300-ft. thick, was formed, and this is in turn overlapped with a still another layer of shale of greenish color and of remarkable thickness (measuring 450-ft. on an average in thickness). It is this oil shale that has acquired much importance as material for extracting crude petroleum from, for instance, in the United States owing to the short supply of kerosene in recent years.

The oil shale at Fushun has only a meagre percentage of crude petroleum. However, in case of the gigantic stripping plan being carried out according to the present scheme, an immense quantity of the oil shale will have to be excavated and removed, and it furnishes a problem for settlement, in order to obtain petroleum therefrom.

Faults.—The organization of the earth's crust progressed in good order as mentioned above, and finally a noteworthy accident happened. As a result of the contraction of the earth's crust, in the centre of the great coal field, a crack or fault of considerable dimensions was created from east to west.

Presumably through the strong pressure on both sides of the coal seam, its central part became pushed up, and it was possibly from some weakness caused by a development in the due order of the geological structure, that the northern part of the seam was pushed up abruptly, whilst in the south the seam dipped northward at about 27°. There was perhaps coal in the northern half of the seam, but now only the lowest layer of gneiss is exposed, and there is no trace of coal, which might have been either washed away or have eroded.

The southern half of the coal seam has fortunately been protected. Since basalt, in its nature, has a great resistant power against weathering, it has been left as a line of hills bounding the southern fringe of the coal field. The coal seam itself, together with the shale layer, is overlapped by the diluvium formed by the Hun River, in the quaternary period, which consists of clay and alluvium being from 30 to 80-ft. in thickness.

Magnitude of Coal Hoard.—The approximate dimensions of the Fushun coal seam have been ascertained by technical estimation, according to which the scum extends from east to west beyond the limits of the Fushun colliery zone, whilst on the south it starts from the foot of the basalt hill and extends in width from 1 mile to $1\frac{1}{2}$ miles. None is found to exist on the bank of the Hun other than above mentioned. The coal hoard in this zone is estimated at about 1,000,000,000 tons.

Quality of Fushun Coal.—Fushun coal is practically uniform in quality. As it proceeds eastward up to Lungfeng pit from the west of Kuchengtzu and Chienchinchai, the coal is found

to gain in coke, nitrogen and ash, whilst it loses in volatile matter. Near Chienchinchai, an extremely hard coal, often called "Kabari," is met with in parts of the seam. "Kabari" is used as material for carving, and figures of popular fairy saints, flower-pots, etc., are carved in the lustrous jet-black coal and are on sale, commanding a pretty brisk demand as souvenirs to visitors to the colliery, Orientals and Westerners. In some parts of the seam, the coal contains much amber, and the Chinese handicraftsmen turn out medicine cases, seal-cases, and like knick-knacks. This particular kind of coal is known to have been carbonized from coniferae. Occasionally, small pieces of pirite are noted to be fastened to the cleaven part of coal. About Kuchengtzu, siderite is mined and makes a material for iron manufacture.

Result of Latest Analysis:—The result of the latest analysis of Fushun Coal is as follows :—

	Water	Volatile matter	Fixed carbon	Characteristic of coke	Ash	Colour of ash
Maximum	3.25	43.01	51.89	Slightly expansive Caking	18.5	Yellowish
Minimum	5.84	33.96	42.90	Caking	17.30	Greyish

	Sulphur	Nitrogen	Calorific power
Maximum	0.81	1.38	7.750
Minimum	0.46	1.21	6.170

From the above table, it may be seen that the comparatively larger percentage of water is a drawback of Fushun coal, which lowers the calorific efficiency compared with the weight. It also interferes a little with the combustion of dust coal which has become quite a popular usage lately. However, the latter difficulty may be surmounted by means of the drying appliances. Next, Fushun coal was considered as falling short of caking property, which renders it unsuited to the manufacture of coke for the smelting furnace of a steel works. Luckily, a coal possessed of a good amount of caking property has been found to occur in the eastern part of the coal seam, and this coal has proved very acceptable. It was for this reason that the two pits of Lungfeng and Hsintun were excavated recently in order to supply coke to the Anzan Iron and Steel Works.

Another characteristic of Fushun coal is that it is rich in volatile matter. This facilitates combustion and adapts Fushun coal to various uses. In particular, as a gas producing coal, Fushun coal takes the first place among its likes in all the Orient.

Again, the fact that Fushun coal contains an unusually large amount of nitrogen suggested the profitability of recovering ammonia by establishing a Mond gas-producer plant. During the great war, the Fushun collieries management could operate twenty generating furnaces on the Mond system and fourteen others on the Limm system so as to put out sulphate of ammonia in a large quantity as a bye-product, while generating electric power.

Last but not least, Fushun coal has still another advantage in that the ash percentage is comparatively low. The percentage seldom goes above 4 or 5 per cent.

It may be counted as still another advantage that the clinkers stick to the grate of the boiler but little, necessitating very small trouble in cleaning the boiler. Then, the contents of sulphur which does most harm to the boiler are extremely small.

Coal is classified according to the percentages of fixed carbon, water, volatile matter, calorific power, etc., into anthracite, semi-anthracite, bituminous coal and lignite of different degrees.

Fushun coal may be placed between bituminous coal of medium and low degrees.

Japanese Match Industry

There is considerable speculation as to the effect which the bill recently passed by the Japanese diet, prohibiting the use of yellow phosphorus in the manufacture of matches, will have on the match trade of Japan, says Reuter's Trade Service. Many manufacturers have foreseen the likelihood of such a bill being passed, and have taken steps to offset any damaging effect it might have on their business by experimenting with other chemicals. Many of the manufacturers have discontinued manufacturing yellow phosphorus matches altogether. There are, however, eight factories in Hyogo prefecture still using yellow phosphorus. Their production has decreased during the past year, partly owing to the prospect of such legislation, and partly on account of the economic depression. In 1919 the output of matches in Japan amounted to 2,436,900 gross boxes, valued at Y. 1,492,418. The output of 1920 was only 755,900 gross boxes, valued at Y. 472,312. Some manufacturers have huge stocks of boxes and labels used exclusively for yellow phosphorus matches, and do not know how to dispose of them before the prohibition becomes effective in a year's time. Unless there is a marked revival in demand these manufacturers stand to lose heavily.

American Aid to China's Tanning Industry

Among the new departments the Peking University is about to introduce into its curriculum will be a course in tannery under the instruction of Dr. H. S. Vincent and John Wang. The following is an extract from the announcement issued by the university :-

"In 1918 China exported $24,000,000 worth of raw hides and imported $15,000,000 worth of leather. There are but four tanneries in China rated as such by the Chinese government and these are relatively small. Such facts constitute a challenge to provide a means of contact for the students of China that they may grasp the economic problems and opportunities of the country. Leather being a basic industry, is being undertaken first, but if this effort is received and supported by the Chinese other branches of manufacturing arts will be offered as may be indicated.

"Twelve hours each week must be spent in the practice laboratory, each student acquiring a proficiency in the various processes of tanning. This practice laboratory is being provided with a complete equipment of modern leather working machinery from America and stocked with the necessary chemicals and dyes and the latest improved tanning compounds.

"For this leather department Peking University has secured two practical tanners who are college-bred men and have had experience in teaching the art of tanning, Dr. H. S. Vincent, the head of the department of leather manufacture, has been seventeen years a missionary in Siam. He instituted and successfully operated a school of leather manufacture in Siam. Dr. Vincent will be assisted by John Wang, who has proved his technical knowledge and practical skill in establishing the Hwa Pei Tannery in Tientsin. Added assurance of success consists in the co-operation of an American firm which stands foremost in the production of leather tanning compounds and whose service men are of international reputation. This firm will send their service men to China from time to time that they may render expert aid to the Peking University leather manufacturing department and to its students and graduates who may be operating tanneries."

Board Enlargement of English Shipbuilding Co.

The board of John I. Thornycroft & Co., Ltd., has recently been enlarged by the election of technical directors, and the secretary of the company, and now consits of Sir John E. Thornycroft (managing director), Mr. S. W. Barnaby, Sir Edwin Grant Burls, Mr. T. Donaldson, Mr. Alex. Glegg, J.P., Mr. J. Maughfling, Mr. John Smith, and Mr. T. Thornycroft. The founder of the firm, Sir John I. Thornycroft, continues his association with the company as advisory engineer and naval architect.

Industrial Development in China

Views of the Chinese Maritime Customs

IN the report on the "Foreign Trade of China," compiled by the maritime customs, Mr. J. W. H. Ferguson, their statistical secretary, says:

Metals and Minerals.—It is very satisfactory to be able to note that the export of metals and minerals made greater strides in 1920 than during the previous year, although, considering the vast resources at the disposal of the country which are only awaiting development, the quantities are still infinitesimal. All the items in this group, with the exception of copper ingots and slabs, quicksilver, tin compound, and zinc (spelter), registered considerable increases. Among the most notable are antimony (regulus, crude and ore), which fell off in 1919 but has now fully recovered, increasing from 147,541 piculs in 1919 to 258,504 piculs; lead and lead ore, which made a remarkable advance from 2,448 piculs in 1919 to 44,989 piculs, and iron ore, the exportation of which amounted to 11,292,407 piculs, as against 10,589,375 piculs in 1919. The export of ores not separately enumerated in the customs returns amounted in 1920 to 507,856 piculs, valued at Hk.Tls. 1,564,653, and comprised bismuth, 1,496 piculs; copper, 3,410 piculs; manganese, 418,725 piculs; molybdenum, 271 piculs; wolfram, 69,273 piculs; and asbestos, 86 piculs.

Machinery.—This heading deserves the notice of all those interested in the future of China, since by the increase in the importation figures of the articles grouped under it may be gauged the progress made by the country on the road of industrial development. The demand for all kinds of machinery, machine tools, and engineering goods is steadily growing, and inquiries are more and more received from remote places in the interior. Machinery of all kinds imported in 1913 was valued at 46 million taels, which increased to 14.1 millions in 1919 and 22.3 millions in 1920.

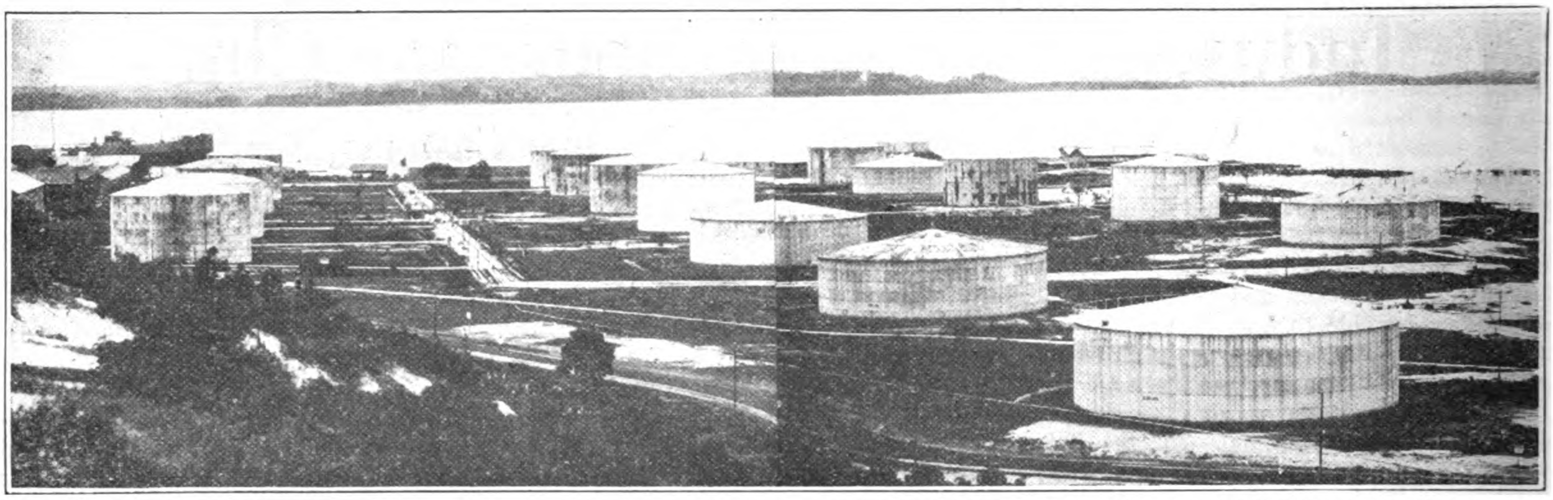
Electrical Materials is another interesting and suggestive heading. A marked development in the use of electrical machinery occurred during 1920. The demand for electric lighting in most cities altogether exceeded the supply, and existing plants were heavily overloaded, with the result that influential merchants and shopkeepers in the various cities purchased small electric lighting sets for the lighting of their own shops and perhaps two or three adjacent premises. These small sets were supplied almost entirely from America. There is a tendency in the more important establishments to install larger units, and while a few years ago 200 and 400 kilowatts were considered large, it is now quite common to install units of 1,000 kilowatts and upwards, and it is reported that a large number of orders has been placed for privately-owned power-stations for the purpose of supplying power to cotton and flour mills. This increase in the amount of machinery installed has of course stimulated the demand for electrical accessories, fittings and lamps. Japan has captured the lion's share of the business in accessories, especially in the cheaper kinds; America has the largest share of the better-class fittings and glassware, while in lamps the market is practically monopolised by the large factories in Shanghai and by Dutch and Japanese manufacturers. The importation of electrical materials into China amounted to 2.3 million taels in 1913, 5 millions in 1919 and 6.3 millions in 1920.

After reviewing adverse business condition Mr. Ferguson continues: Nevertheless, viewed from a wider outlook, there are many bright spots discernible. The present is a transition period unavoidable after the economic upheaval caused by the great war, and must end sooner or later, when conditions again approach their normal level. Furthermore, the potentialities of the industrial and commercial development of China, with its vast resources as yet scarcely touched, and with its teeming population, hardworking and industrious as nowhere else in the world, are such that confidence in the country's future would appear to be fully justified. Already foreign goods are being absorbed by the people in steadily increasing quantities. Factories modelled and managed on foreign lines are springing up in every suitable locality. At the end of 1920 there were more than 400 of these factories producing articles of foreign type and enjoying special customs treatment. 48 of these manufacture soap, 31 candles, 29 cotton yarn, 26 flour, 25 cotton socks, 24 cotton piece goods, 20 miscellaneous cotton goods, 17 paper, 15 cigarettes and tobacco, 10 slate pencils, 7 biscuits, and so on down a long list containing a most varied assortment of household and other articles in daily use. Many other signs of progress are noticeable. The University of Nanking, through its department of sericulture, is endeavoring by scientific study to improve the silk industry of China, while the government authorised the formation at Chefoo of an international committee for the improvement of Shantung silk. The international committee for the improvement of sericulture in China, situated at Shanghai, is doing good work; and a similar committee, having the same purpose in view, was recently established at Canton. As the staple articles of export from China are of a bulky nature and have often to be conveyed over long distances from the interior, it is gratifying to notice that the improvement of transportation and the construction of roads is increasingly engaging the attention of the provincial authorities. Motor-boats are also coming into favor on inland waterways, and motor-cars are now encountered wherever the roads lend themselves to this traffic. Shipbuilding in China is becoming a flourishing industry, with a promising future, and is likely before long to be counted among the great assets of the country along with its coal, iron and steel industries. Railway construction has not advanced much in recent years, no doubt owing to difficulties caused by the war and the high silver exchange; but as the need for railway communication throughout the country is obvious, it is expected that extension of the existing lines and construction of new ones will be resumed without delay. Harbor and river conservancy is not neglected, and there are several works is progress improving conditions in this connection. The lighting of the coast of China and the establishment and maintenance of the necessary aids to navigation is constantly being improved and added to.

Foreign Firms in China

The government bureau of economic information quotes the following figures regarding foreign firms in China from the journal of the high industrial commissioner:—

	Firms.	Personnel.
U. S. A.	413	6,660
Belgium	20	391
Denmark	27	546
Austria	5	27
Great Britain	644	13,234
Netherlands	25	367
France	171	4,409
Germany	2	1,235
Italy	19	376
Japan	4,878	171,485
Norway	12	249
Portugal	93	2,390
Russia	1,780	148,170
Spain	8	272
Switzerland	4	632
Others, unclassified	33	537



PANORAMIC VIEW OF THE STORAGE TANKS OF THE ROYAL

Petroleum in the N. E. I.

THE development of the petroleum industry in the Dutch East-Indies is of comparatively recent date. The first concession was granted in 1883 in Lankat (North Sumatra) and has since been followed by several more.

At the end of 1918 the number of concessions granted and sanctioned by the Dutch East Indian government amounted to respectively 61 and 26, of the latter 15 especially for petroleum and other bituminous substances.

The chief centres of production are located in the provinces :

South and East Division of Borneo : Palembang : Acheen and dependencies : East coast of Sumatra : Rembang : Sourabaya : Amboina (the island of Ceram).

The products obtained from the crude oil are, among others: benzine, kerosene, residue or liquid fuel, lubricating oil, asphalt, paraffin wax, from which candles and battik wax are also manufactured. The oil from the various districts differs in appearance and composition, so that it can be worked into a large variety of products.

The Sumatra oil, for instance, produces benzine, kerosene and lubricating oil, while the heavier Borneo oil yields kerosene, oil fuel and paraffin wax. Benzine is put on the market in two grades: light and heavy. That obtained from Sumatra is of the best quality. Great quantities are shipped to Europe. Kerosene or illuminating oil finds its chief market in Java, in British India, China, Japan, Australia and East Africa, Alexandria is the most western market. Turbine.—This product serves as a substitute for turpentine.

Diesel and solar oil form intermediary products between kerosene and lubricating oil. Liquid fuel or petroleum residue is used as fuel in the refineries, while large quantities are shipped to different parts of the world. Batching oil finds a market in British India in the jute industry, where it is used to soften the fibres and make them supple during the process of weaving.

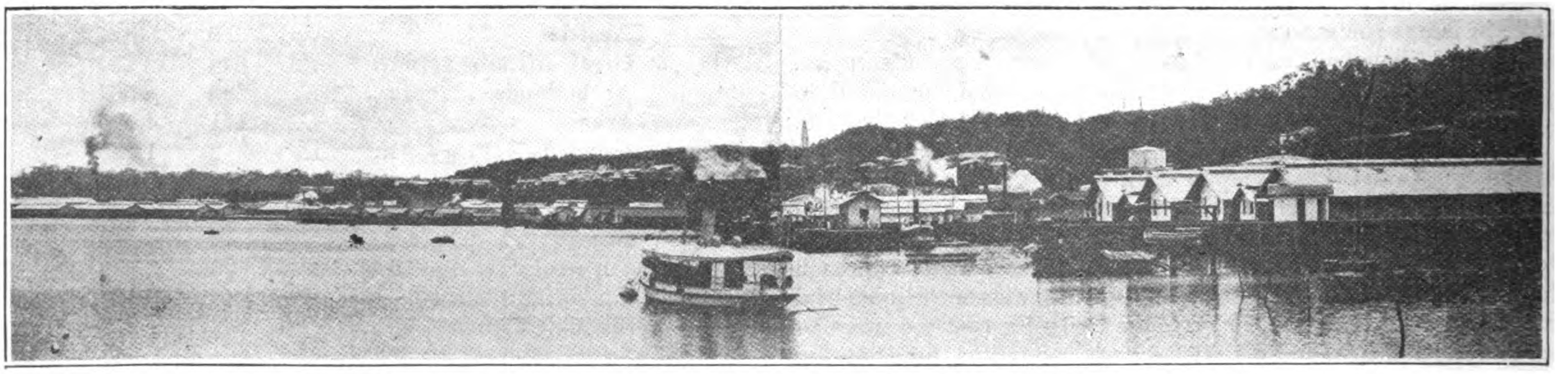
Lubricating Oil.—A modern plant for the distillation of engine oil is being constructed at Balikpapan, while there are two working in Java and Sumatra.

Paraffin Wax.—The paraffin factories in Java and Borneo put a large quantity of the finest paraffin wax on the market. The one at Balikpapan is one of the largest and best equipped in the world.

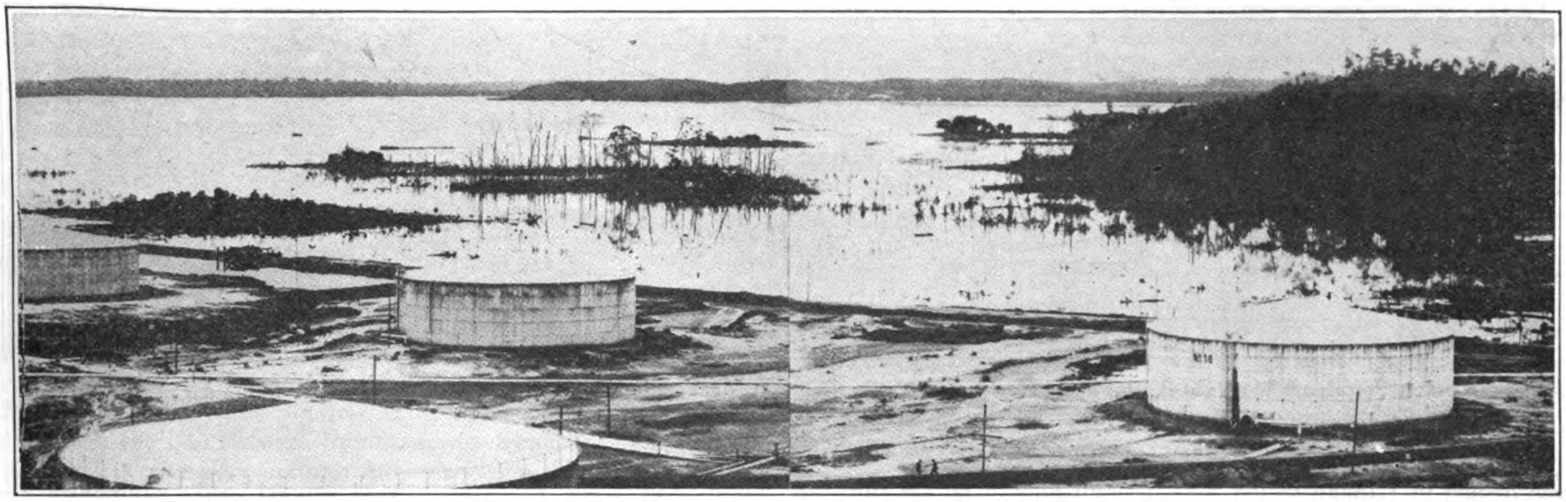
A part of the wax is used for the manufacture of candles which, on account of the high melting point of the Borneo paraffin, are particularly suitable for use in the tropics. The factory in Java provides for local consumption, the one at Balikpapan for export.

Battik wax finds a market in Java in the domestic battik industry. Asphalt is sold partly on the local market and the remainder abroad. A large fleet of tank steamers carries the products to all parts of the world. The greater part is shipped in bulk, but various ways of packing are also used, for which purpose the tin factories supply the material.

Petroleum Companies.—The principal company, which controls almost the whole manufacture and output in the Dutch East-Indies, though known under different names, is the "Royal Dutch Company for exploiting petroleum wells in the Netherlands Indies" (Koninklijke Nederlandsche Mij tot exploitatie van petroleumbronnen in Ned.-Indie), which was founded in 1890.



Royal Dutch Petroleum Works at Balik-Papan, Dutch Borneo, View from the Harbor



DUTCH PETROLEUM CO. AT BALIK-PAPAN, DUTCH BORNEO

Gradually this Company made connections with various other companies for the buying of the crude product, its shipping and distribution, with the aim of securing for itself a place in the world market. Beyond the Dutch East-Indies, also, it is steadily extending its sphere of activity for that purpose.

In 1907 the Company was reorganized and several new companies came into being namely :

(*a*) the Bataafsche Petroleum-Mij., affiliated to the Royal Dutch,

(*b*) the Anglo-Saxon Petroleum Company, affiliated to the Shell Transport and Trading Company,

(*c*) the Asiatic Petroleum Company.

The Bataafsche Petroleum Mij. obtains the crude oil at the producing centres outside of Java and manufactures the products.

The Anglo-Saxon Petroleum Company ships and transports them, while the Asiatic Petroleum Company has charge of the distribution and sale outside the Dutch East-Indies.

Inside the Dutch Indies this is handled by the Dordt Petroleum Company, which also obtains the crude oil in Java and manufactures the products.

The Royal Petroleum Company presents an example of a wide-branched organization, which has made it possible to bring the petroleum industry in the Dutch East-Indies to a high degree of perfection.

Following are the figures regarding the production and export of the Netherlands East-Indies for 1918 :—

Export of Petroleum Products in 100 L.

Production of crude oil in tons	Benzine and gasoline	Kerosene	Residue	Turpine
1.764.203	317.073	379.044	291.057	2.556

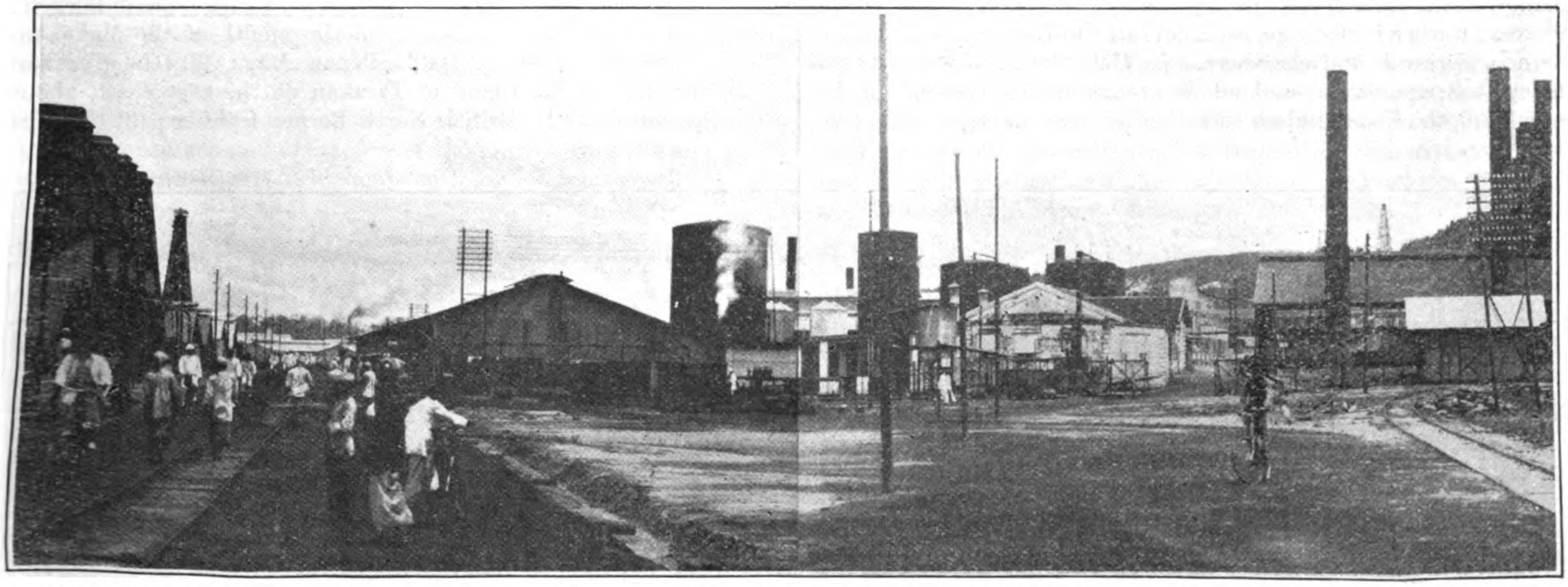
Export (in tons of 1,000 Kg.) of :

Paraffin Wax	Candles	Lubricating Oil	Asphalt	Greases
21.045	4.080	24.529	1.719	232

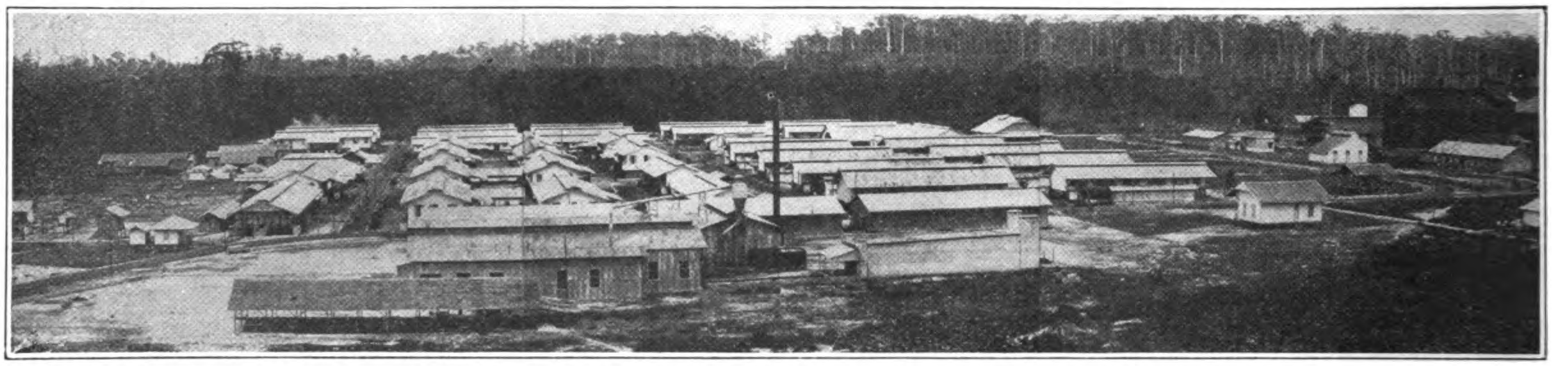
The Petroleums of Borneo

At the meeting of the Institution of Petroleum Technologists held on March 15, James Kewley read a paper describing the characteristics of the petroleums obtained in Borneo.

The petroleum industry of the East Indies is of comparatively recent growth, dating back in the case of Borneo to not earlier than 1897. The production of the Koetei fields, which were first developed, has steadily increased and has been supplemented by that of areas developed at later dates. Indications of petroleum had long been known in Borneo and the other islands of the East Indian archipelago. As far back as 1853 Motley noticed oil occurrences in the island of Labuan. In 1863 Menten found also seepages in the island of Tarakan, on the east coast. In 1866 a shallow well

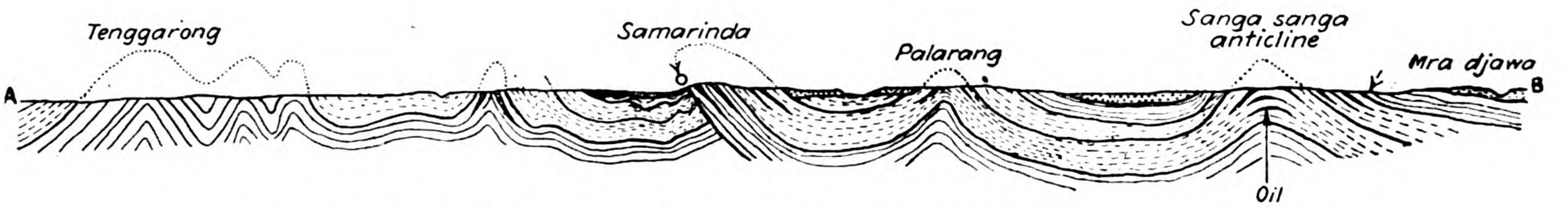


View of Main Plant of the Royal Dutch Petroleum Co. at Balik-Papan, showing the Buildings devoted to Refining the Crude Oil into Benzine, Kerosene and Fuel Oil. Capacity, 2,000 tons per day

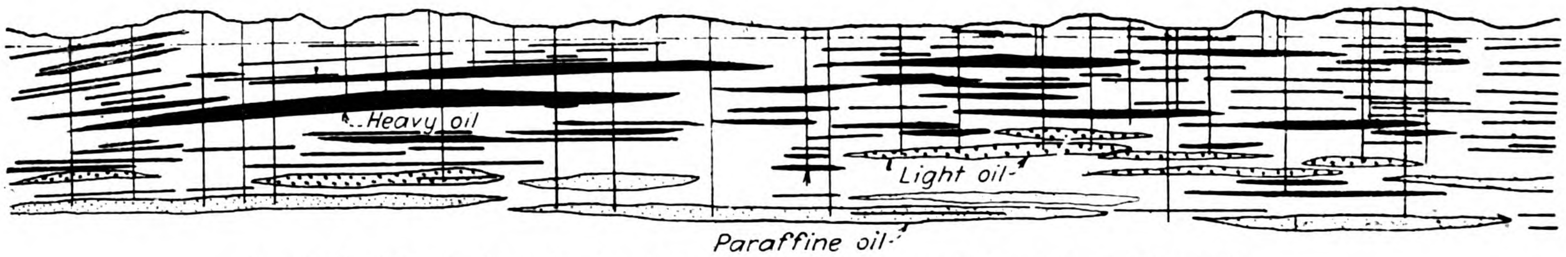


Royal Dutch Petroleum Works at Balik-Papan, Houses for Native Employees. The large building on the right is the Sulphuric Acid Factory with a Producing Capacity of 700 tons per month

was drilled in Labuan which gave a small flow of oil for thirteen years at least. Collingwood, in 1868, described a petroleum spring in British North Borneo, and stated that others were known. About 1887 three wells were in existence on the Klias peninsula on the north of Brunei Bay, and these gave oil in very small quantities. Menten, in 1888, obtained oil and coal concessions near the mouth of the Mahakam River, which concessions give to-day the most important output. In 1891 he obtained further concessions near Balik Papan, then a tiny fishing village, now a thriving refinery centre. Futher indications are found in the Bolongan area in West Borneo, Sarawak and elsewhere. In 1897 the first well was put down at Sanga Sanga, and oil was found at 58 metres. In August, 1898, the Nederlandsch Indische Industrie en Handle-Maatschappij, and about the same period several other companies, for instance, the Bombay-Burmah Trading Co. in British Borneo, and the Koetei Exploration Co. in East Borneo, began operations. In 1901 the Royal Dutch began to drill in Koetei, and the East Borneo Co. a little later. The production of these fields rapidly increased, and had already reached a figure of nearly 60,000 tons in 1900. At the present day the production of Borneo is about 4,000 tons per day.

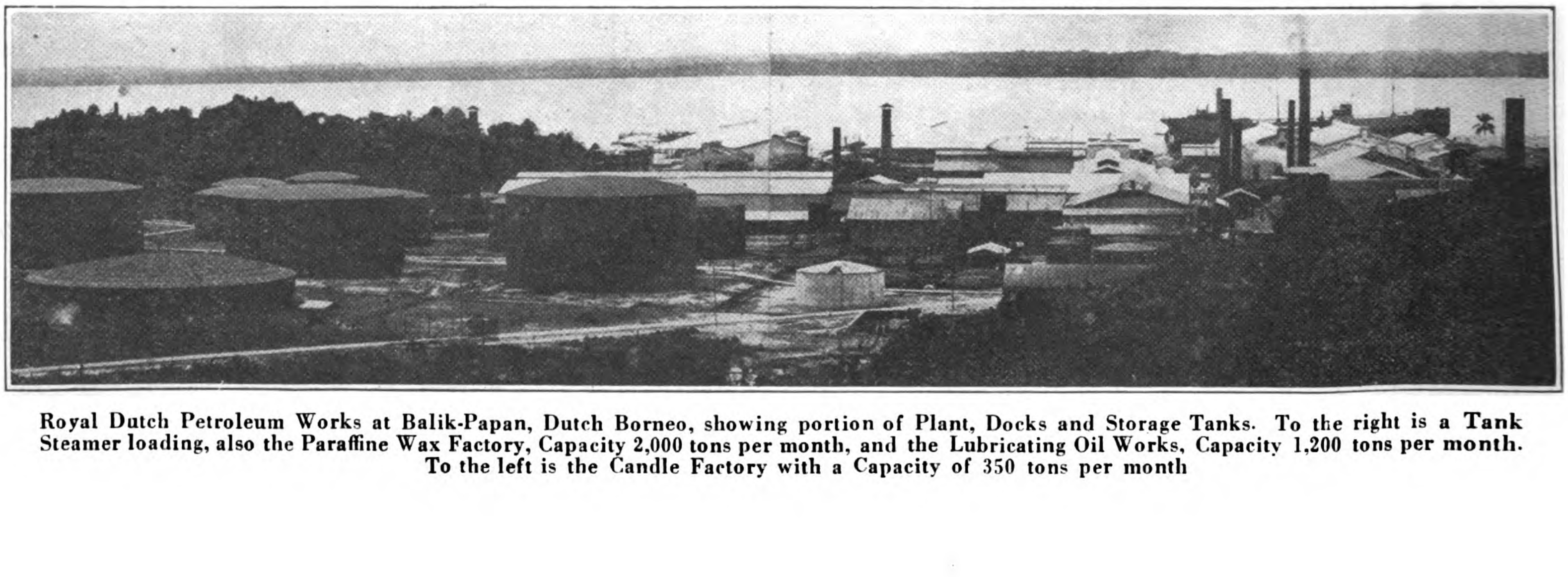


Cross-Section of Sanga Sanga Oil Field Across Anticlines and along the Mahakan River (after Jezler)



Longitudinal Profile along the Sanga Sanga Anticline, showing position of Sands (after Jezler)

There are at present three important producing areas in Borneo: (1) the Koetei area, extending from the mouth of the Mahakam River southwards toward Balik Papan Bay; (2) the Tarakan field, situated on the island of Tarakan on the east coast, about 80 miles south of the British North Borneo frontier; (3) the Miri



Royal Dutch Petroleum Works at Balik-Papan, Dutch Borneo, showing portion of Plant, Docks and Storage Tanks. To the right is a Tank Steamer loading, also the Paraffine Wax Factory, Capacity 2,000 tons per month, and the Lubricating Oil Works, Capacity 1,200 tons per month. To the left is the Candle Factory with a Capacity of 350 tons per month

area, on the west coast in Sarawak, about 150 miles south of Brunei Bay. These three areas differ to some extent geologically, and considerably in respect to the types of oil they yield.

In the Koetei fields three distinct types of crude oil are found, namely, heavy asphalt oils in the upper strata, light asphalt oils at greater depths, and paraffin wax oils at still greater depths.

The structure of the Tarakan field is that of a system of two domes with a depression in between, the major axes of which run in a north-south direction. In this area, which is also of delta formation, Poliocene sand predominates. The field is developed in part of the delta which was nearer the coast and where consequently sands predominate, the interlying clays being not so well marked. Pliocene coals, or rather lignites, often containing boulders of older coal from the late Miocene formation, are frequent. The oil from this field is markedly uniform in composition.

The Miri field lies on the west coast of Borneo. The geological structure here is not yet so well known as that of the two fields described above. There is a well-marked anticline, the eastern wing being very much the steeper. The oil is drawn from the western wing. The strata here are also of Miocene age, and coals are absent. The oils of the Miri field are fairly uniform in character, but differ fundamentally from those of the Koetei and Tarakan fields.

The crude oils of Koetei fall into three main classes : (*a*) heavy asphalt-base crude oils ; (*b*) light asphalt-base crude oils ; (*c*) light paraffin-base crude oils. The oils have one character which sharply differentiates them from practically all other crudes so far known. The specific gravities of the distillates are much higher than those of corresponding distillates from most other crudes. The same applies to the refractive indices. These characters, and the inability of kerosenes produced from these crudes to burn in any ordinary lamp without arrangements for an extra supply of air, were naturally soon discovered (Ragosin, *Pet. Rev.*, vol. 8, 1903, p. 59). The reason for this is the presence of unusually large proportions of aromatic hydrocarbons in these oils. The occurrence of aromatic hydrocarbons in crude oils has long been known. In fact, aromatic hydrocarbons have been found in small quantities in most crude oils, but seldom to an extent greater than 15 per cent., usually to a much less extent. Examinations of Koetei oils have shown that they contain extraordinary quantities of aromatic hydrocarbons, amounting to as much as 40 per cent., consisting chiefly of benzine toluene and meta-xylene.

It is interesting to note that the high aromatic content of Koetei oils, which some years ago rendered them of comparatively low value, eventually rendered these oils of the greatest importance to the British empire as a source of toluene.

The consideration of a few generalizations drawn from a study of the occurrence and characters of the crude oils of Borneo, particularly of the Koetei field, may be found to throw a little light on the origin of petroleum. The crude oils of the Koetei field were either developed *in situ* or else they migrated from some mother rock into their present reservoirs. If these oils were found *in situ*, then they must be of vegetable origin, as there is no indication in the sands and coals of sufficient animal matter to have yielded such quantities of oil. Further, had they developed *in situ*, they must have arisen either from the coal or from the vegetable matter which formed the coal. Experience does not lead one to expect that they have been formed from the coal, and the change of vegetation, partly into coal, partly into oil, is equally contrary to experience. The other view, that the oils migrated into their present position, is much more probable, and is supported by certain evidence afforded by the differences in composition of the crude oil from different horizons. Conditions advantageous to migration exist in the Koetei and Tarakan fields. In the former, clays and sands alternate, but the layers are discontinuous owing to their formation under delta conditions, so that a zigzag course is open to the oil migrating upwards, there being, however, many opportunities for retaining portions of the oil under impervious clays *en route*. A possible source of the oil is to be found in the foraminifera limestone (which is a shallow water deposit accumulated quickly) of the early Miocene, or possibly in the marl formation of the underlying Eocene. It is possible that as the oil migrated upwards, coming into contact with or passing through the coal beds, some chemical interaction between the oil and the coal may have taken place. One might expect, therefore, differences in composition of the oils which have been arrested in their upward course by local obstacles at different horizons. This is, indeed, undoubtedly the case. The oil found at the greatest depths so far drilled is rich in paraffin wax. The oils found at higher levels are poorer in paraffin and richer in aromatic and asphaltic constituents. The early Miocene greensand formation, which underlies the Koetei petroliferous formations, has not yet been penetrated by borings, but it is found outcropping in the Palarang anticline, which runs parallel to that of Sanga Sanga, some miles further inland. The nature of the oil found there in these lower strata is in accordance with the view put forward. This oil had the relatively low specific gravity of 0.831, yielded 40 per cent. of a kerosene of specific gravity 0.809, which burnt well in a Hinks lamp, and which was of very low aromatic content. The crude was, moreover, rich in paraffin wax. This oil comes from a level below the coal-bearing strata. These facts suggest the possibility of the paraffin-rich and aromatic-poor oil having undergone some chemical interaction with the coal in its passage upwards, which resulted in a diminution of the wax content and increase in the aromatic and asphaltic constituents. It is difficult to understand in what way such a change could have come about. The facts, however, exist and need some such explanation. In the Miri fields, where coals are absent, the oil is low in aromatic and asphaltic content ; the oils of Perlak, in Sumatra, where coals are absent, are lower in aromatic and asphaltic content than those of Moera Enim, in which field coals are present. The fact also that the difference in character with increase of depth is so very much less marked in the Tarakan field, where the geological conditions are much more favorable for easy migration, lends support to this idea.

Petroleum in British North Borneo

At the last annual meeting of the British North Borneo Company, the chairman said that the position as regards oil is interesting. The British Borneo Petroleum Syndicate granted the Kuhara Mining Company of Japan a sub-concession to prospect for oil in the whole territory, except the Klias Peninsula and Mangalum Island, the oil interests in which were reserved for exploitation by the D'Arcy Exploration Company, which is a subsidiary of the Anglo-Persian Oil Company. The sub-concession to the Kuhara Company carried a right to extension for a further two years until 1921, but owing to the company having omitted to give the necessary notice, their prospecting rights have lapsed and are now vested in the D'Arcy Exploration Company. The D'Arcy Company now propose to proceed with the geological examination which was being carried on by the Kuhara Company, so we can rest assured that no stone is being left unturned to trace all available sources of oil in the territory. As the result of their prospecting operations, the Kuhara Company have decided to bore for oil at Sequati, in the north-west, where they are about to commence operations, a large quantity of drilling plant having already been landed.

As regards the Klias Peninsula, the presence of oil has already been proved there. The D'Arcy Company have intimated, however, that they do not consider that the area promises sufficiently large quantities of oil to justify further exploitation. Notwithstanding, the British Borneo Petroleum Syndicate are pressing for the exploitation of this area, and we may hope that operations will be resumed at no very distant date.

Mineral Wealth of Tonkin

By G. GIRAUD

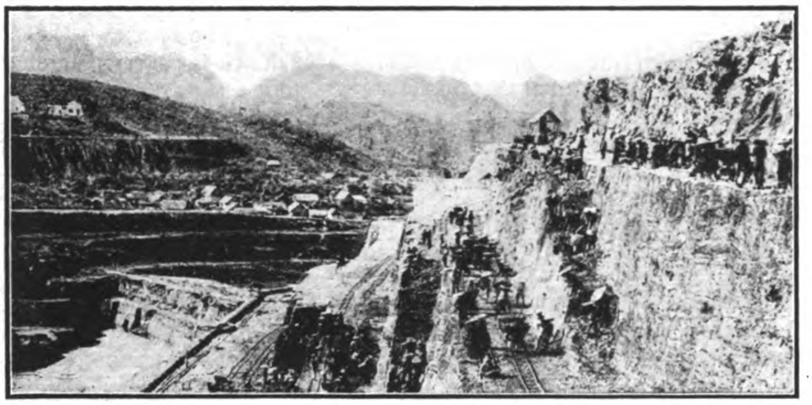
Commercial Attache for French Indo-China in the United States

TONKIN is situated in the northern part of French Indo-China, between the Gulf of Tonkin, Southern China, Northern Annam, and Laos, with an area of 119,000 sq. kms.

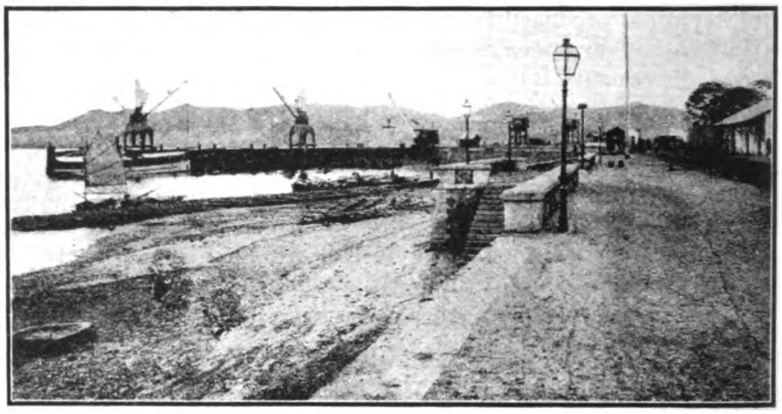
It is divided in two distinct parts: the Delta, with its great rivers;—the Thai-Binh and the Song-Coi (Red River) forming alluvial deposits covering an area of 13,000 sq. kms. and the upland region consisting of hilly country rising gradually towards the North into mountainous regions, with deep valleys forming the foot-hills of the Chinese chains of mountains, Yunnan and Kuangsi. In Tonkin alone the Red River covers 670 kms. (409 miles). It is the natural route of transportation for the products of the great Chinese province of Yunnan, thus making Tonkin the most important and favorable means of penetration into China.

Besides the Red River, the railroad connecting Haiphong with Yunnan-Sen, capital of the Chinese province of Yunnan, facilitates this penetration, and an extension of this railroad to Szechouen, the richest province in China, would minimize its distance from Tonkin to 50 hours instead of 30 days of difficult travel. The importance of this has not escaped the attention of other countries the English try to reach it from the valley of the Iraouaddy and by the cañons of Tibet; the Russians tried the penetration by way of Turkestan; Siam tries to divert the traffic from the Upper Mekong by building a railroad from Bangkok via Lopburi, Makon-Sawan, Outaradit, which is far from being completed; the French sought for a long time a practicable route through the valley of the Mekong, across Cochin-China and Laos. Of all these routes, the one of Yunnan across Tonkin is the most rapid and comfortable, going through rich mining regions. "The Yunnan railroad has already intensified commercial relations between Tonkin and Southern China" — to quote from the latest report of the British Consul at Saigon—"and has made of Haiphong the transit port of Chinese limithroph provinces."

The mineral wealth of Yunnan had for a long time attracted the attention of scientists, engineers, and financiers. Its exploitation and its exportations by way of the Tonkin route, are big sources of profit. Similar mineral wealth is found in Tonkin, of which the soil and subsoil are full of inestimable promises. The work of surveyors and prospectors has been unfortunately retarded by the war. Permits to survey granted by the government in 1919 totaled 189 and the number is increasing slowly. In the same year, four concessions for new mines were granted, bringing the total number of concessions granted up to 336.



Open Cut Coal Mine at Hongay



Coal Loading Cranes on Hongay Pier

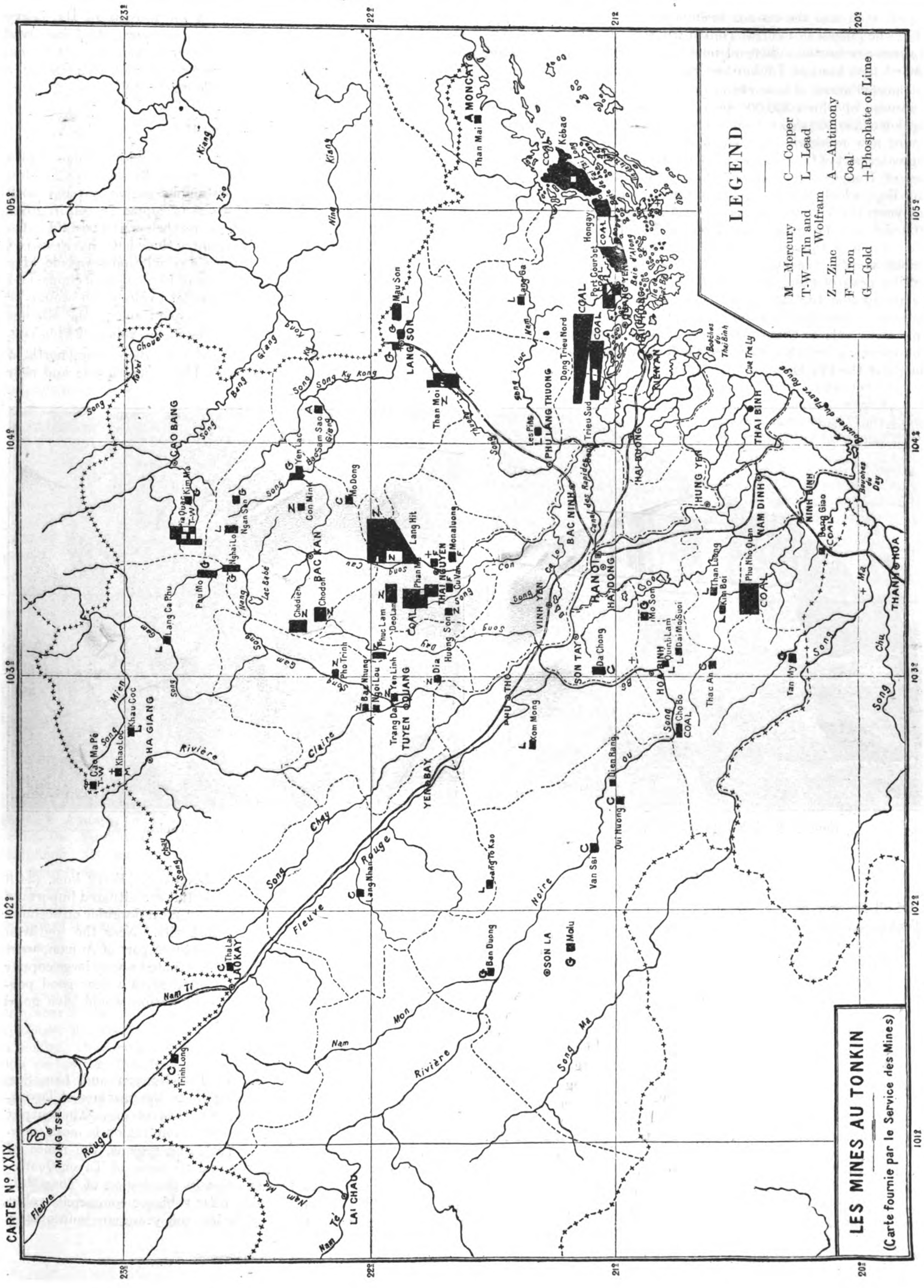
Coal Fields

In Asia, as elsewhere, the countries possessing coal-fields have a future. Out of the five countries forming the "Union Indo-Chinoise Française," Tonkin is the richest in coal-fields The most valuable strata are found in the coal pits stretching from Bac-Ninh to the Island of Kebao, running through Dong-Trieu and Hongai. These strata are anthracite of very good quality containing from 5 to 12 per cent. volatile matter and giving an average of 7,500 calories. About 50 kilometres north of Bac-Ninh are found "Affleurements Houilles" 200 to 300 metres (600 to 900 feet) wide, which may be followed for 15 kilometres between Thai-Nguyen and Can-Vau.

The richest coal mines, namely those of Hongai, Kebao and Dong-Trieu have the advantage of being situated on the coast of Bay Along and possessing wharves in deep and calm waters, thus permitting direct loading of large deep sea vessels. The Hongai mines are the biggest producers amongst Indo-China coal-fields: from 92,000 tons in 1892, their production increased to 250,000 in 1901; to 300,000 in 1902; to 498,000 in 1914; to 540,000 in 1915. This increased production is due entirely to the development of their exportation to China and Japan. A part of the coal dust of these mines is compressed into bricks with the addition of 10 per cent. of coaltar and 20 per cent. of Japanese soft coal, thus giving 8,500 calories.

The Kebao coal-fields extend over 25 kms. (15.5 miles) in a northeastern direction, being a prologation of the Hongai mines. The caloric power of this coal varies from 7,000 to 7,850.

East of Kebao, between Tien-Yen and Monkay (near the Chinese boundary) are situated the Tien-Yen mines, little worked as yet, though of good quality. The coal-fields of Kebao-Hongai extend west near Dong-Trieu toward the "Sept-Pagodes" to Bac-Ninh, constituting the coal basin of Dong-Trieu. About 50 kilometres (31 miles) N.W. of Bac-Ninh are the coal fields of Yen-Bai. Those of Lang-Son, with the "affleurement" of Ki-Lua and Loc-Binh, are also worthy of attention. The output of the coal


LES MINES AU TONKIN
(Carte fournie par le Service des Mines)
CARTE No XXIX
LEGEND
M—Mercury
T-W—Tin and Wolfram
Z—Zinc
F—Iron
G—Gold
C—Copper
L—Lead
A—Antimony
Coal
+Phosphate of Lime

fields situated near the sea coasts finds a ready market in the Far East. The output of Central Tonkin will furnish, if intensified, the fuel necessary for the industrial activities of the region. It should be noted that Central Tonkin has excellent railroad facilities.

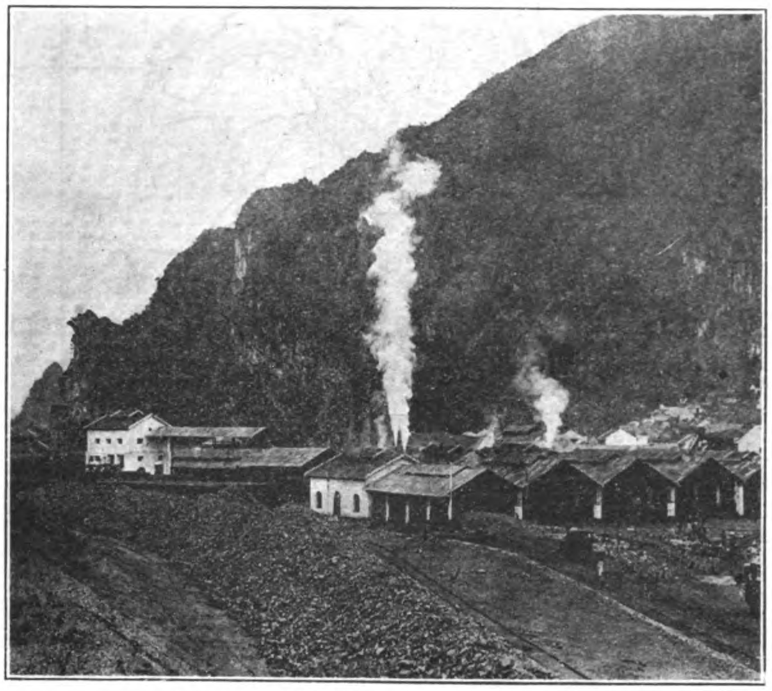
The coal mines of Indo-China yield an average of 650,000 tons per annum, of which 350,000 tons are exported. The home consumption of 300,000 tons is increasing rapidly because of the development of new industries and particularly of ship building plants. The greater part of this coal production is furnished by the celebrated mines of Hongay (they are open air mines) along the banks of Along Bay, which produces 540,000 tons of coal per annum. For many years this coal was denied its real value to the great profit of the Cardiff and Japanese coal. To-day, Cardiff coal is rare on the China seas, and Hongay coal is sold in Japan. The next in importance are those of Dong-Trieu and of Mao-Ké. The coal produced by both of these mines is of heavy quality and as a result their production has doubled within the last two years. While there seems little likelihood that Indo-Chinese coal mines will ever supply the needs of France, because of their situation, there can be no question but that they are likely to replace imported coal throughout the Far East.

cost price is unfortunately very high on account of the heavy freight charges and the expenses of middlemen. The industrial development of French Indo-China, as well as that of South China, together with the projected construction of railroads, insure a brilliant future for the metallurgical plants of Tonkin.

Copper Mines

Copper is found in nearly all parts of Tonkin Some strata are very rich, like those of the Black River, 27 kms. (18.7 miles) upward from Van-Yen in a mountainous region covered with forests and bamboo. The cropping-out of copper is seen in green and tender rocks of schist, which nevertheless is resistant. On account of the dense forests of this country these lodes have escaped attention from the Chinese and natives, a population always looking for copper. This ore contains an average of 14 per cent.of copper and 14 grammes of gold to the ton. A rational exploitation would be profitable, as native labor is easily obtained among the Muongs (tribes) and the numerous Chinese living in the valley of Phu-Yen.

Other cupriferous lodes are found near Bien-Dong, north of Haiphong; at Kep, 9.3 mil. north of Phu-Lang-Thuang and near



Hongay Coal Bricquette Plant, Tonkin

Cho-Dien Zinc Mine, Tonkin

Iron Ore

Of all the iron ore strata in Indo-China, those of Thai-Nguyen in Tonkin are the most advantageously situated for profitable exploitation. They extend over 45 kilometres (28 miles) between Nha-Nam, Co-Van, Mot-Luik-Nham and No-Nha-Con, and have many pockets, some of which contain more than 15 million tons of ore above the level of the plains. The subterranean wealth has not yet been determined. The ore contains brown and red hematite, oxydulated and magnetic iron. It is very pure and assays at an average of 60 per cent. The proximity of the Thai-Nguyen factory and Dong-Trieu coal-fields should encourage the establishment of steel and blast furnaces in this region, owing to the fact that all around Dong-Trieu are found rich strata of castine and manganese, so necessary for the economical treatment of iron ore. More iron mines are to be found 25 kilometres (15.5 miles) N.W. of Cao-Bang, on the Song-Bag-Giang River, at Moxat, and at Bu-Xat, in the N.W. of Laokai, on the right bank of the Red River.

Statistics show that every year the Far Eastern countries, going from British India to Japan, import nearly one million tons of steel products from England, Belgium and France, but their

Pho-Hing-Giu, 31 mil. N.E. of Thai-Nguyen. Forty kms. (24.8 miles) N.E. of Laokai and near Trai-Huit are situated important strata, on the right bank of the Red River, most desirable on account of the proximity of the Yen-Bai coal pits. Near the southern boundary of Tonkin, in the extreme northern part of Annam, west of Than-Hoa and the Gulf of Tonkin, is situated a very large copper bed. As the copper ore found in Tonkin gives a very good percentage, a general and up-to-date exploitation would give good profits.

Zinc

The regions of Tuyen-Quang, Thai-Nguyen and Lang-Son are rich in zinc. The mine of Trang-Du in the province of Tuyen-Quang produces yearly about 10,000 tons of ore. The output of Khein and Bac-Nhung mines in the same region is most satisfactory. In the Lang-Hit and Van-Lang regions, the mines of Thai-Nguyen have an output equal to those of Tuyen-Quang. Next in order come those Lang-Son in the region of Than-Moi. The zinc and tin beds of Tonkin offer a bigger commercial value than any other ore beds. For the last ten years zinc mines have

been worked according to the demands of reasonable exploitation. The following figures will convey an idea of the importance of these mines :—

1904	200 tons of ore
1908	9,300 .. .. ..
1910	20,000 .. .. ..
1914	31,500 .. .. ..
1915	34,400 .. .. ..
1916	41,000 .. .. ..
1918	28,000 .. .. ..
1919	48,000 .. .. ..

Tonkin zinc gives an average of 40 to 56 per cent.

Japan is the principal buyer. Favored by her geographical situation, she has almost cornered the Haiphong market to the disadvantage of other nations who are handicapped by the high freight rates.

In 1915 the average price of calamine with a percentage of 50 per cent. zinc, was 180 francs per ton, while during the first half-year of 1914 it was about 90 francs. The continuous rising prices put zinc at 300 frcs. per ton f.o.b. Haiphong.

Tin

In the Caobang region near the Chinese frontier are found extensive beds of tin, which are situated in a high valley on the slopes of the Pia-Quac mountain in the district of N'Guyen-Binh, circle of Cao-Bang, and are successfully worked. The ore contains an average of 50 per cent. of tin, some going as high as 65 per cent. The proportion of ore to a cubic metre of dirt, after washing out, is 5 kilos. The tin beds of these regions deserve the particular attention of capitalists on account of the high price of this metal. It find a ready market either in Haiphong or Long-Tcheou, from where the Chinese take it to Hongkong by the Song-Bang-Giang and the Canton River. Tin is often found mixed with wolfram or tungsten. In 1909 196 tons of tin and 17 tons of wolfram were exported : in 1916, 424 tons of tin were taken out. The average price for a ton of tin is 5,000 francs. The unity of "anhydride tungstique" is quoted at 64 francs in the Haiphong market. In Europe it is worth about 110 francs.

Antimony

Mines of antimony are found in Tonkin in the regions of Monkai, Cao-Bang, Laokay and Phu-Nho-Guan, also on the northern boundary of Annam. This ore is brought directly either by junks or by the Yunnan railroad to the plant which is situated near Haiphong. Tonkin antimony ore is not very rich, but this plant can treat it on as low a basis as 14 per cent., and the metal produced being first class (96.60 per cent. pure antimony) finds an eager market in the Far East and the United States. The annual production of this metal is 1,500 tons, absorbing almost all the local ore.

Manganese

Two extensive manganese beds are known to exist in Tonkin : One near Philiet ; the other near Thai-Nguyen. The ore is concretioned pyrolusite (bioxyde of manganese) purple or blackish in color. This metal could be very useful in the treatment of iron ore at the Thai-Nguyen mines. Outside the metals already mentioned Tonkin possesses other minerals such as : argentiferous lead, mercury (cinabre), graphite, etc. . . . . , not to mention gold and precious stones.

"White Coal" in Tonkin

Out of all the French colonies and protectorates, Indo-China is the very spot where industry is developing most rapidly. The utilization of "white coal," hydraulic power, renders enormous services, especially in Annam, Laos and Tonkin, where river rapids and waterfalls are numerous. In Tonkin, the necessity of treating zinc ore at the mines made the utilization of waterfalls desirable. Chobo is an ideal place for the erection of a hydraulic power plant for the treatment of cyanamide calcaire — a new product replacing azoted fertilizer. Carbide of calcium, which is the basis of this product, is extremely abundant in Chobo. Japan and the Dutch Indies import at present 200,000 tons of cyanamides.

Conclusion

The mineral wealth of Tonkin offers a vast field of exploitation. New discoveries are made continuously, and even gold is being found in veins and in river beds. The latest discoveries are phosphates and graphites. The favorable geographical situation of Tonkin, with its valley of the Red River penetrating into China, its railway of Yunnan and other railways going toward Kwang-Si, make for industrial development, which in turn will cause important orders of all kinds of building material, machinery and tools. Former Governor-General Doumer in his report to the secretary of the colonies, ten years ago, said, "Indo-China is the storehouse of the Far East, principally of Japan. Tonkin alone demonstrates this assertion, especially in the field of mineral wealth." The official report of the "Service des Mines de l'Indochine," Indo-Chinese mining department P.W., gives the mining production of Tonkin during 1919 as follows :-

Coal : 665,000 tons, as against 636,000 in 1918 and an average of 645,000 annually during the war : tin and tungsten 429 tons ; zinc : 15,934 tons as against 200,000 in 1918, and an average of 41,000 in the years 1915-16-17 :

Other figures for 1919 were :

Iron	5,100 tons
Phosphates	7,050 ,,
Graphite	7,501 ,,

These figures speak by themselves. They show that the upsetting influences of war did not at all affect Indo-China, and especially Tonkin. The critical period which came after the war is over now, and Tonkin can follow her economical development with absolute confidence in its splendid future.

Industrial Notes from Moukden Customs

There was considerable building activity in the Japanese railway zone during 1920, but at the end of the year it is reported that there are some 300 houses vacant. In the foreign settlement new houses have been built by the Standard Oil Company, the Banque Industrielle de Chine, and the British-American Tobacco Company, while many new buildings were left uncompleted at the beginning of the winter. In the city several of the larger Chinese business houses have built new premises in foreign style, including the Bank of Communications.—On the 1st December a long-distance Japanese telephone service between Moukden and Antung was inaugurated.—Railway extension of the Ssu-Chêng Railway in the following directions has been planned : from Chengkiatun (鄭家屯) westward to Tungliaohsien (通遼縣), a distance of about 80 miles, and a further extension from Tungliaohsien in a north-westerly direction to Taonanfu (洮南府), a distance of some 170 miles.—A Sino-Japanese Company has been formed for agricultural development in the neighborhood of Chengkiatun and Tungliaohsien.—The results of the experiment made by the Toa Tobacco Company in cultivating foreign tobacco in the neighborhood of Fenghwangcheng have not come up to expectations, owing to lack of experience on the part of the farmers and to unfavorable climatic conditions.

The Kirin Kwainei Railway

THE expiration of the provisional agreement for the financing and construction of the Kirin-Kwainei Railway having expired, it is reported that Mr. Ono, vice-president of the Industrial Bank of Japan, now in Peking, has been endeavoring to obtain its renewal. This has given rise to many loose stories about further Japanese loans to the Peking government in contravention to the consortium understanding. As a matter of fact this line is outside the scope of the consortium, and Japan is free to negotiate the loan for its construction whenever the Peking authorities are ready to to take up the matter. The construction of this railway was provided for in an agreement signed between China and Japan on September 4, 1909, to settle the questions surrounding the Korean boundary dispute. Article 6 of that agreement states:

"The government of China shall undertake to extend the Kirin-Changchun Railway to the southern boundary of Yenchai, and to connect it at Hoiryano with a Korean railway, and such extension shall be effected upon the same terms as the Kirin-Changchun Railway. The date of commencing the work of the proposed extension will be determined by the government of China considering the actual requirements of the situation and upon consultation with the government of Japan."

Subsequent to the above, a further agreement was entered iuto on October 12, 1917, between the Chinese government and the Yokohama Specie Bank for a loan of Y.6,500,000 with the Kirin-Changchun Railway as security, the terms of which placed the administration of the railway in the hands of the South Manchuria Railway Company, who receive two per cent. of the net profits for its services.

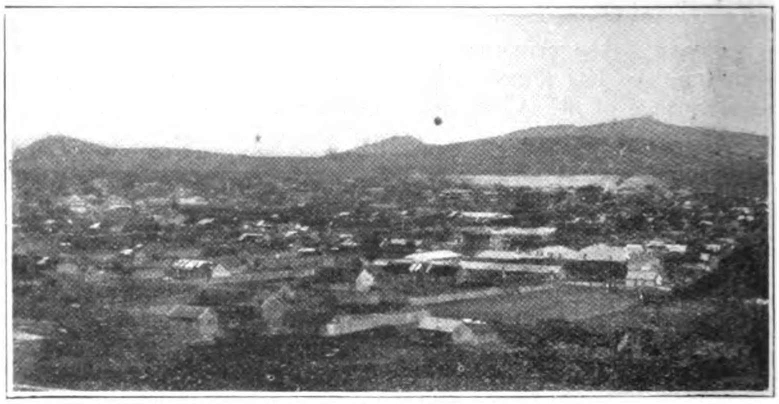
On June 18, 1918, a preliminary agreement was signed between the Chinese ministry of communications and a group of three Japanese banks (the Industrial Bank of Japan, Bank of Chosen and Bank of Taiwan) for the construction of the extension of the Changchun-Kirin line to Hweining on the Korean border, opposite the Korean town of Kwainei, the terminus of the short line which leads to the Korean seaport of Seishin. The amount the loan was reported to be $20,000,000, to be floated in the form of Chinese government bonds bearing interest at five per cent. and to be issued by the three Japanese banks. The security was to be the physical property and earnings of the line. The agreement provided also for the erection of a steel bridge over the Tiumen River to

The Banks of the Sungari River at Kirin. Huge Rafts of Logs are floated down from the Mountains to the South and East

connect the Chinese and Korean systems, the cost of which was to be equally borne by the Chinese and Japanese governments. An advance of $10,000,000 was paid over to the Chinese government after the signing of the preliminary agreement.

The line is of great strategical and commercial importance to Japan, assuring to her another outlet for the raw products of northern Manchuria, and at the same time, strengthening her strategical position against a menace from the north.

The proposed line is 262 miles in length. Starting from Kirin, it passes through. Tatun, Hsiakiang, Mifeng, Shuangchaho,



General View of Kirin

Ohomuchan, Pataohotzu, Laoyehling, Takuchiatzu, Tachiaoho, Wulintun, Wulinkou, Chingling, Hsiaomachiatzu, Weihuling, Paotzukou, Pingfang, Chengchang, Choulitzukou, Peiweitzukou, Tunhua, Tungtuyaotzu, Tashitouho, Panchiaotzu, Haerhpa, Lingfengmichetzu, Liangchutai, Yushuchuan, Laotoukou, Shankuantaokou, Fungfassu, Tungkuantaokou, Chaoyangchuan, Lungchingtsun, Holunghsien, Huakushengling, etc. Most of the country is mountainous. The Sungari, Mutan and Tumen Rivers with their tributaries wind through this region, and their valleys contain fertile strips of land. Then, the zone marked with gentle undulations is mostly suited to cultivation and has plenty of room left for reclamation as the means of communication is developed.

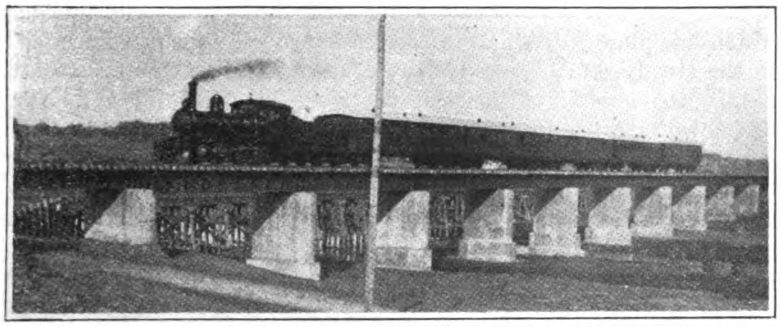
At present there are no means of communication and the territory is practically cut off from the outside world. Therefore few immigrants are attracted to this region. Moreover, it is surrounded with mountain ranges like high walls. Between Kirin and Omso and Tunhua, the two ranges of the Laoyehling and Changkwangtsailing run from northeast to southwest; between Chosen Peninsula (Korea) and Chientao there rises the Huaku Range; between Tunhua and Harbin there is the Paling Range; and on the south the Lungkang Range and the Mutanling Range, spurs of the Paitoushan Range.

This region is sparsely populated, and has no native industries, there being only 1,200,000 *hsiang* (or 864,000,000 *tsubo*) of land under cultivation divided among the twelve prefectures of Kirin, Huatien, Mengkiang, Shulan, Panshih, Tunhua, Omso, Ningan, Yenchi, Holung, Wangtsin and Hunchun.

The projected Kirin-Kwainei Railway will enable the arable area to be doubled in a short space of time. Especially, the agricultural products from the Sungari Valley and the fertile region of Chientao, which are often called the "Granary of Manchuria" will be of enormous quantity.

However, it is expected that the major portion of the traffic will consist of goods in transit from Changchun, to the Korean seaport of Seishin, rather than cargoes between intermediate points on the new line. For this reason, the products along the Harbin-Kwanchengtzu Section of the Chinese Eastern Railway and also the Kirin-Changchun Railway will be forwarded via the new railway for Japan, and as return freights, cotton yarn and cloth, together with sundries, will be brought for distribution to the district along the Kirin-Kwainei Railway.

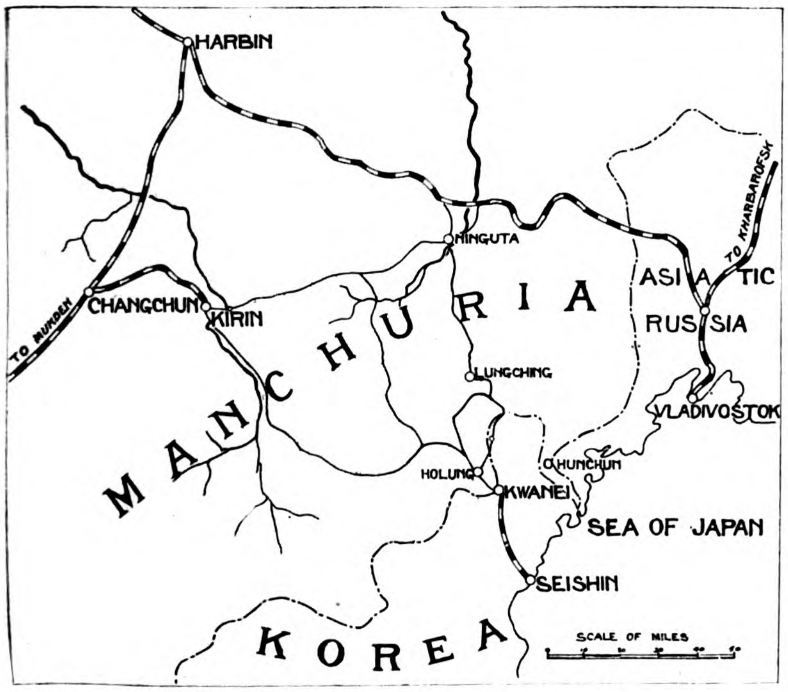
The greatest value of the road, however, will be in the opening up of this fertile region to bean and wheat production, and providing homes for the overcrowded population of other parts of China. The region is also well adapted for cattle raising, containing many rich grazing plateaus. It would be mere speculation to hazard any estimate of the acreage and crop possibilities of this



A Train on the Kirin-Changchun Line

region, of which so little is known. A recent Chinese official report on the resources of Kirin province states that the coal mining districts of the province are located in Machiakow, Hoshihlintse, Chinyao, Lwannikow and Penshilin of Kirin; Shahotse and Meikaokow of Itung; Yinchiakow and Penchaiho of Shulan; Wutaokow and Szetaokow of Panshih; Futushan and Talintse of Pinhsien; Kwanmentsutse of Hunchun, Fuyikow of Tungning, and Lannikow of Omu. Unfortunately, modern mining methods are conspicuous only by their absence and primitive practices, coupled with the financial inexperience of the promoters, cause the failure of many companies. The capital of the companies varies from a thousand dollars to a hundred thousand dollars. The Tung Yuan Mining Company has a capital of $100,000 and is located at Machiachow. The Pao Chih Company at Hoshihlintse is maintained with a capital of Tls. 100,000. These are only undertakings which conduct their enterprises on a large scale and which have sufficient reserve funds. The former has an annual output of 6,500 tons and easily ranks as the highest-producing mine.

There is little coal of superior quality in Kirin. Generally it is bituminous, soft, weak and of a dull appearance. It is slow in combustion and is unfit for steam purposes. Most of it is transported overland to the big towns or to the nearest railway stations.



The New Line Will Eventually Effect a Connection Between Kirin and Kwainei

Kirin, Pinkiang and Changchun are the venues of concentration, the Kirin-Changchun and Chinese Eastern Railways being used in transportation.

Quality and locality have to be considered in arriving at the price of the coal. On an average it is: Kirin, $5.50 per ton, Changchun, $5.20 per ton, and Pinkiang, $5.70 per ton. There is little local demand—firewood is mainly used as fuel—and the low quality of the product and the high transportation charges militate against its export.

Steamer Launched at Kowloon Docks

A SUCCESSFUL launch of a new steamer took place recently from the shipbuilding ways of the Hongkong & Whampoa Dock Co.'s premises at Kowloon Docks.

The vessel, a sister ship to the *Hektor* which was launched last February, has been built to the order of Messrs. Brunsgaard Kiosterud & Co. of Drammen, Norway, and under the supervision of their Superintendent Captain Ivar Siqveland.

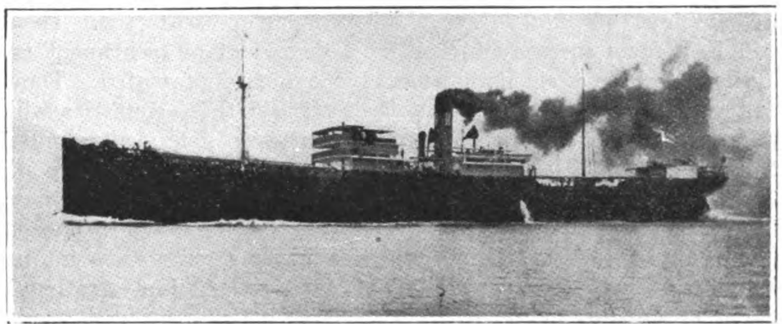
The launching ceremony was gracefully performed by Mrs. R. M. Dyer, the wife of the chief manager of the Hongkong & Whampoa Dock Co., Ltd., the vessel being christened *Hellen* as she left the ways.

After the ceremony the company adjourned to the offices of the Company where the usual toasts were honored.

The principal dimensions are as follows, viz.:—

Length between perpendiculars 400 feet, breadth moulded 52 feet, depth moulded to upper deck 31 feet, 'tween decks 8 feet, erections 7 feet 6 inches.

A total deadweight of 8,250 tons will be carried on a mean draft of 25 feet 6 inches, the speed loaded being eleven knots per hour.



The s.s. *Hektor*, sistership to the s.s. *Hellen*

Propelling machinery constructed by the builders is amidships and of 3,100 indicated horse-power, consisting of one set of triple-expansion surface-condensing engines having cylinders 27-44-73 inches diameter by 48 inches stroke, steam at 180-lbs. working pressure under forced draught being supplied by three cylindrical return-tube boilers of 15 feet 6 inches diameter by 11 feet 6 inches long.

The engine and boiler room outfit includes a Weir's D. C. heater and Weir's main feed pump, independent centrifugal circulating pump, also general service, ballast and condenser pumps.

Unusual in cargo steamers is the See's ash ejector and ash ejector pump installed for disposal of ashes from the stokehold.

The coal bunkers are of large capacity, and provision has been made for carrying oil fuel throughout the double bottom in accordance with Lloyd's requirements, the vessel having been specially surveyed during construction by Messrs. Gardiner and Morrison, local representatives for Lloyd's Register of Shipping.

The Far Eastern Review

A Monthly Review of Far Eastern Trade, Finance and Engineering, Dedicated to the Industrial Development and advancement of Trade in Far Eastern Countries

ENGINEERING FINANCE COMMERCE

5 JINKEE ROAD, SHANGHAI, CHINA

Telegraphic Address: Farview, Shanghai

SHANGHAI, AUGUST, 1921.

Democracy in Asia

THE Wood-Forbes mission to the Philippines and President Harding's call for a Pacific conference is an announcement to the world that the United States has awakened from its day-dreams to face the stern realities of a critical situation handed over by Wilsonian theorists for more practical Americans to solve. The two steps are correlated. The report and findings of the mission will serve as the basis of a program that will guide our delegates to the conference on Pacific matters and assist in the formulation of a definite American policy. It is a big job. It called for a big man. President Harding picked the biggest American, gave him as associate the foremost American expert on Philippine affairs, and let them pick their lieutenants. True to their record, General Wood selected Colonel Frank McCoy, and Governor Forbes called upon his old friend and assistant, Lt.-Col. Bowditch to form part of the mission. Both of these officers served as assistant chiefs of staff to General Pershing directing the work of G. H. Q. at Chaumont, under General Harbord, and then accompanied their chief on the Armenian mission. The quartette are trained observers with a full knowledge of the East gained from actual service on the ground. General Wood is a man of cool and calculated judgment with a clear grasp on the issues at stake. Neither he nor his assistants are men who can be led astray by specious pleading, propaganda or misrepresentation. They will look facts squarely in the face, devoid of all sentiment or ideals and base their findings on the evidence presented. They will visit China and Japan but their stay in these countries will partake more of the acceptance of courtesies extended because of their nationality and personal distinction. The problems of Asia are being unfolded to them from all angles and it becomes more and more evident that they are narrowing down to one of idealism *versus* materialism. America has arrived at a point in her international relations where she must either adopt a rational practical foreign policy in order to ensure the continued good-will of others, or, insist upon the application of ideals in Asiatic countries which encourage unrest, sedition and revolution.

The cherished American doctrine that all men are created equal, that all government shall proceed from the governed, that the proclamation of a republic is evidence of the fitness of a people however backward, to govern themselves and enter the family of nations, must be squarely faced from the practical political viewpoint.

Can the Filipinos govern themselves? Have they, in twenty years of American tutelage, reached that high state of political development that will enable them to paddle their own canoe in these stormy seas of Asiatic politics? This question is part of a greater one. On its answer depends whether there is to be internal peace in Asia, or, continued unrest and revolution. In seeking for the answer the mission cannot escape facing the similar problem involved in the ability of the Chinese to successfully maintain a republican form of government, and from this, turn their attention to the clamor of the people of India for autonomy, for independence. These problems are all correlated and should be considered as a whole in fixing American policy in Asia.

Americans were the first to welcome the Chinese republic into the family of self-governing democracies. American writers and constitutional experts insist that the Chinese are the original democrats, peculiarly fitted and adapted to manage their own affairs. This laudable attempt to extend democratic ideals throughout the world by giving moral support to every people who proclaim a republic must naturally meet with the opposition of other nations holding opposite viewpoints. Much of the unrest and intrigue which has plunged China into successive revolutions can be traced to the steady pressure applied by other nations to counteract and nullify the spread of political doctrines in Asia which menace their own security.

If we admit that the 400,000,000 Chinese, steeped in the traditions of their past, inexperienced in the ways of modern government, have arrived, over-night as it were, to that point where they are now competent to exercise the right of suffrage and manage their own affairs under a republic, with all that this implies, what answer can Great Britain make to the 350,000,000 Hindoes when they clamor for autonomy?

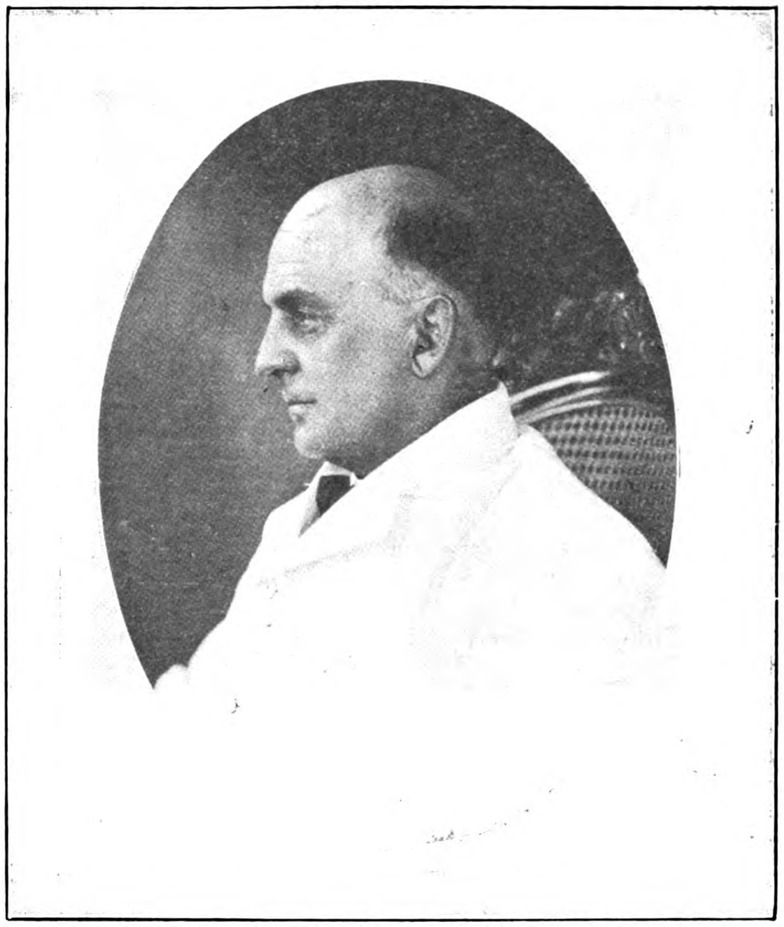
If the Chinese, without previous political experience or preparation in self-government are accepted without question into the democratic family, their cause ardently championed by American professors and high salaried advisers, what answer can America make to the Filipinos when, after twenty years of direct supervision, they insist upon their ability to govern themselves and demand independence forthwith? If we admit that the Chinese are fitted to run a republic, must we not in all fairness extend the principle to the Hindoo, to the Filipino, to the Korean and other Asiatics? Great Britain justifies her policy in India on the political backwardness of the Hindoo, necessitating a long period of training before they can be entrusted with full autonomy. The present governor-general of Korea recently stated that the ballot cannot with safety be extended to the Koreans; in other words, the identical reasons put forward by America to justify our policies in the Philippines. If the United States now declares that in twenty years the Filipino has been raised to the level of the Anglo-Saxon and is competent to govern himself, Great Britain and Japan must either acknowledge the inferiority of their methods, or, what is more likely, condemn the American action as too hasty.

These are phases of the Far Eastern problem that should be seriously considered in connection with the investigation of the Wood-Forbes mission. Sentiment should give way to reality in answering the question: "Have the Asiatic people arrived at that stage where they are competent to manage their own affairs? Have they, in a few years of tutelage without sacrifice on their part, attained to the political level of the Anglo-Saxon with his thousand years of progress behind him"? The question is timely and pertinent, for, if the Chinese have reached that point, there is no good reason why America should refuse independence to the Philippines. If, on the other hand, they have not yet demonstrated their ability to manage their affairs under a republican form of government, we must then be prepared to throw overboard sentiment and ideals and co-operate with other nations for the establishment of some acceptable form of government that will bring stability to the Chinese nation and put an end to international squabbling in this part of the world.

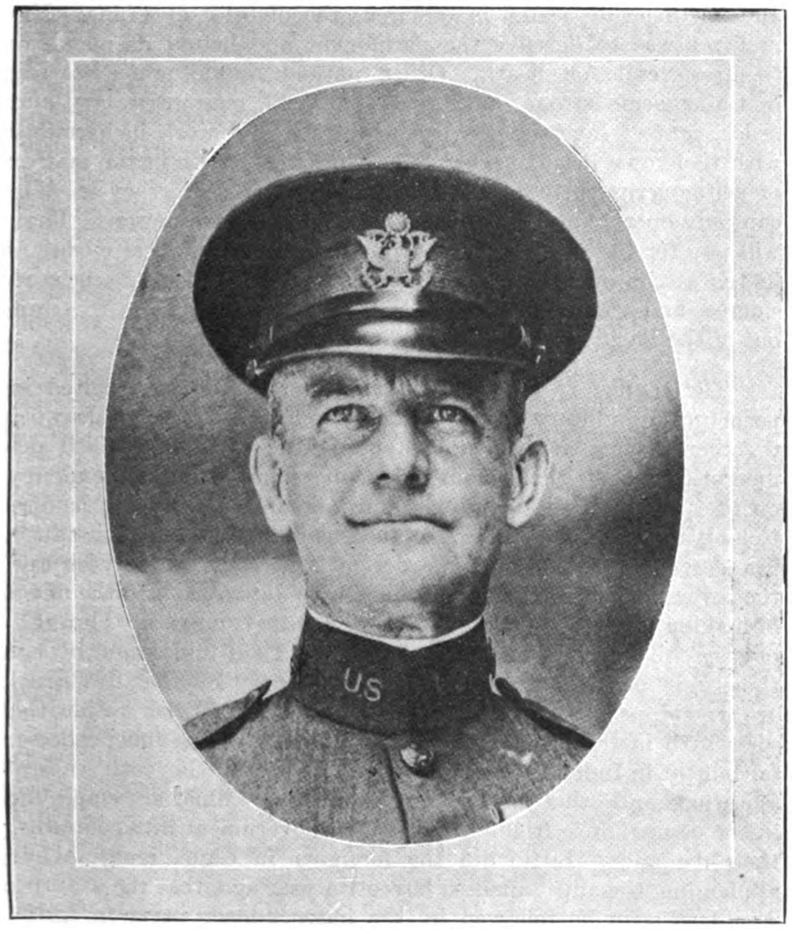
A successful republic in China became a menace to the existing order of things in all other Asiatic countries at the time it came into existence. Her neighbors were opposed to the too rapid spread of democracy amongst peoples unfitted by centuries of training and traditions to manage their own affairs. Even the much abused old empress-dowager and the Manchu princes realized the danger of granting a constitution to the Chinese without a long preparatory period of training. It is easy, therefore, to understand that any self-government drive in Asia must meet with opposition by other politically practical powers whose possessions are menaced with disorder by the too rapid spread of these doctrines. It would seem that if order, peace and prosperity are to prevail in Asia, then some common understanding between the powers is necessary for the recognition of each other's problems.

THE WOOD-FORBES MISSION

Major-General Leonard Wood



Hon. W. Cameron Forbes



Colonel R. Frank McCoy

Lieut.-Col. Peter Bowditch

Both of these officers served as assistant chiefs-of-staff under General Harbord at G.H.Q., in Chaumont, and afterwards formed part of the mission which reported on conditions in Armenia and Asia Minor. They are trained observers peculiarly fitted by character and experience for the work on which they are now engaged.

Americans resent the spread of Bolshevist and other doctrines subversive of their ideals of government in their own country. The Monroe Doctrine, amongst other things, was the answer of the United States to the Holy Alliance for the overthrow of democracy. Other powers have respected the American position on the western continent, and if this is to be continued, we, in turn, must reciprocate and refrain from interference by propaganda in their affairs. To insist upon the right to spread doctrines amongst the backward peoples of Asia that make for unrest and revolution, implies that we are creating trouble for other powers less sentimental and idealistic but eminently more politically practical than ourselves. If Americans are in Asia as missionaries of democracy to convert and lead the Asiatic forward towards the goal of self-government, then other nations whose interests are threatened will come together to oppose them.

We have but to gaze upon the picture unfolded before our eyes in China, Korea, India and the Philippines to sense that while headed in the right direction the process of evolution is too rapid. The Chinese republic is one in name only. It is a farce, a travesty on the good name of democracy. The picture reveals the most absolute military autocracy and dictatorship that the modern world has seen. Steeped in corruption, inefficient, weak, bankrupt in diplomacy and treasury, the power of the Peking government ends at the walls of the capital, in some instances at the gates of the yamens. Ten years of "democracy" has brought China to the brink of disaster, with the floating wealth of the nation safely stowed away in the strong boxes of the military leaders or their metropolitan satellites.

We see a nation of 400,000,000, of which 390,000,000, keeping one hop ahead of starvation, are preyed upon by a close group of militarists and maintained in a state of constant ferment by western-educated theorists working through student bodies directed by foreign advisers.

The extension of democratic ideals and manner of thought to a handful of Chinese has converted this once contented and united people into a warring jangling mass of sectional political fanatics, led by student politicians, vociferating about the rights of man, universal suffrage, democracy and other catchwords pleasing to the ear of the masses. Democracy in China is the cloak under cover of which the handful of agitators hope to gain the support, sympathy and dollars of the sentimental American, and take over the lucrative jobs now held by the military satraps.

Powerless to overthrow the Peking military government by force of arms, devoid of that spirit which should cause them to rally around the flag of Sun Yat-sen, this element now proposes to the powers the withdrawal of diplomatic recognition from the Peking government and extension of support to the student and commercial bodies who have succeeded thus far through publicity in posing as organized public opinion.

This, however, is only one side of the Chinese picture. The country is split asunder by the Yangtze into two halves, north and south, with two presidents, two cabinets and various independent or semi-independent sections awaiting to see which side offers the greatest inducement in return for their allegiance. The northern government at Peking is a puppet show manipulated by Chang Tso-lin, the tuchun of Manchuria, and deriving its prestige from diplomatic recognition of the powers. There is nothing democratic, republican or sentimental about this show. It is autocracy, militarism run mad. It represents the inevitable outcome of good intentions meddling with the affairs of China, and goes back to the time when the celebrated "Flying Wedge" induced President Li Yuan-hung, under threat of civil war in the Yangtze, to sever diplomatic relations with Germany. The militarists saw their opportunity to consolidate their hold upon the country through the medium of the vast war loans that were expected to come from the United States. The parliamentary party likewise recognized the danger to democracy in China involved in entering the war against Germany under such conditions, and revolted. The picture presented to the world in China during the progress of the great war revealed that while the allies were responding to the call to put an end to militarism and make the world safe for democracy in Europe, the full force of their diplomacy was seemingly directed towards cementing the power of the militarists and destroying the germ of democracy in China. If there had been any consistency, any real effort to make the world safe for democracy, the moral and material support of the allied governments would have been extended to Dr. Sun Yat-sen and his party, instead of bolstering up a military oligarchy in Peking whose efforts were concentrated in throttling the democratic movement in the South. When his attention was called to this inconsistency by the writer, President Wilson notified President Li that internal peace in China was more essential than direct participation in the war. The admonition, however, came too late. The country was split asunder and remains so to this day. The cause of democracy in China was lost, and a predatory militarism firmly fastened upon the Chinese people.

In the meantime, other powers contributed to the support of the military oligarchy in Peking as holding out the only hope of a centralized government that would restore order and bring stability and prosperity to the country. Japan, for military reasons, advanced large sums to Peking, which were employed mainly in carrying on campaigns to crush the South. Sun Yat-sen and his chief lieutenants, who revolted originally to avoid entering the great war under the leadership of the military party (thus incurring the charge of being pro-German) saw the opportunity to shift their front, and justify their continued opposition by declaring that the North had sold out to Japan.

The cumulative effects of years of Western meddling in the affairs of China are before us. We are facing the same situation to-day that arose in 1913 when the other powers came together to support Yuan Shih-kai through the Reorganization Loan. Despite the opposition of President Wilson and the withdrawal of the American group from the China consortium, the loan was made and Yuan firmly seated in power as the dictator of China. His first act was to dissolve the parliament and hound its members to prison, exile or death. Other nations would prefer to see in China some strong authority that will guarantee law and order, protect investments, promote trade and work in harmony with their own ideas of what is best for the Asiatic in the matter of self-government. The too rapid spread of democracy in Asia can only operate against the best interests of these powers. They will pay for the mistakes of sentimental and impractical meddlers in the affairs of China. Their interests should, therefore, be considered and respected, if any lasting understanding is to come out of the Pacific conference.

The conflict of ideals in China which has so far resulted in perpetuating military rule in Peking has had the effect of drawing together in sympathetic understanding the various so-called democratic elements throughout Asia, and we find a marked tendency on the part of Hindoo, Filipino and Korean independence leaders to look up to Dr. Sun Yat-sen as the great champion of their cause. The desertion of this Chinese leader by Americans and British and the severance of his friendly relations with Japan has had the effect of making him a popular idol in other Asiatic countries. Throughout the villages of Bengal, his photos are, I am told, found by the thousands decorating the walls of the most humble dwellings, are worshipped by the Hindoos as a god. The British authorities view with increased concern the rapid spread of the independence movement in India, in which practices, such as the boycott, student agitations and other methods imported from China, are employed in the campaign to frighten the British government into conceding their demands. Little did the foreigner in China realize when applauding the anti-Japanese boycott a year ago, that the example would so soon be followed by the independence party in India. This helps to explain an attitude which inclines to the belief that the establishment of a strong central rule at Peking under whose direction the masses can be led gradually along paths

of political development that will fit them in time to exercise control over their own affairs under some system of constitutional government, is the best for China.

We have arrived at the point where a common meeting ground must be found in order that the interested powers may agree amongst themselves as to the form of government they will unite to support in China. The present situation cannot be permitted to drag along indefinitely without inviting recurrences of soldier outbreaks, or worse, that in the end will paralyze all trade and industrial development. True, the powers, acting through the consortium, can adhere to their present wise policy of non-intervention and withhold financial support until the Chinese agree as to their permanent form of government. But conditions have arisen which may force their hand in this matter, compelling them in self-interest to unite in a definite policy on this particular point. It is only necessary to point to the forthcoming Pacific conference called for November, to realize that any agreement between the powers as to their future policy in the Far East must be based upon a united China under some form of government that will permit this nation to assume its full share of the responsibilities for the maintenance of peace in Asia. Unless China appears before the conference united, and with some settled program, there can be no lasting result. The question, therefore, arises: Are the powers prepared to recognize and support financially the present military oligarchy at Peking, or, will they go to the other extreme and back the southern or parliamentary party?

It is admitted by all impartial observers that neither side can impose its will upon the other unless furnished with the sinews of war in the way of loans, arms and munitions.

The hope that either side can hold out without funds long enough for the other to surrender must be abandoned. The situation is too loaded with dynamite for the outside powers to sit quietly on the side lines and wait another decade for the Chinese to muddle through. Dr. Sun Yat-sen, at least, recognizes that there is no time to lose, and, after defeating Lu Yung-ting in Kwangsi, he proposes to declare open war upon Peking and entertains the hope of eventually marching northwards with his conquering army and settling scores with Chang Tso-lin and the other warlords opposed to the establishment of a parliamentary government. Dr. Sun is on the war path, and can be depended upon to push his victories as far as his slender resources will permit. Whether one approves of Dr. Sun or otherwise, there can be no question as to the remarkable advances made under his direction of affairs in Canton. Graft may still exist in Kwangtung, but if it does, it is reduced to a minimum. Extravagance has given place to economy, with everybody working together for the attainment of their ideal. After a visit to the medal-bedecked tuchuns of the North, it is a relief to enter the presidential office at Canton, and be received by a quiet modest gentleman, dressed in the plainest of civilian clothes surrounded by evidences of a most democratic and unostentatious taste. Dr. Sun may be impractical, he may be a dreamer, he may be inclined to socialism, but he is a patriot and an honest man. It is difficult at this time to oppose a national leader because he is considered idealistic or socialistic in his views. It will be many years before the principal nations of the world are ruled again by such idealists as Wilson or semi-socialists like Lloyd George. They were, however, honest. The people believed in them. Likewise Dr. Sun Yat-sen is honest and the people of China, the 390,000,000 human beings keeping that one hop ahead of starvation, look up to him as their savior. This is the strength of Dr. Sun. The military leaders and politicians of Peking realize this and dare not proscribe him. Dr. Sun glories in the fact that he is a man of the people, son of a coolie. He has cleaned up, beautified and improved Canton within the limitations of the funds at his command. His son, Mr. Sun-fu, a graduate of the University of California, is the mayor of the city and takes a personal interest in seeing that reforms are carried out. The people of Canton, irrespective of party, are proud of Dr. Sun Yat-sen. They are with him, believe in him and will stick to him. He stands alone in all China, the one ruler who holds the real affection and loyalty of his people.

"If the powers are seeking to establish a strong central government in China, along lines that will permit the people in time to take their place in the world of democracy, why should they not give me their support" says Dr. Sun. "The militarists," he added, "rule by force and crush the people through taxation and maintain the country in a constant state of warfare to further their own ambitions. The people love me and will be guided by my advice. If you want a strong government, get behind and support me and I will give it to you, and it will be an honest one," said Doctor Sun to me in a recent interview. And I, who had held his power-of-attorney to finance the railways he was authorized to construct, realized that Dr. Sun spoke the truth.

I wish to digress to tell a story. In 1912, I was invited by Dr. Sun to take over the duties of technical secretary to the Chinese National Railway Corporation, which held the mandate from President Yuan to devise a national system of railways, organize a company and negotiate with foreign bankers for their financing and construction. I was finally given full powers to proceed abroad and conduct the preliminary negotiations with the bankers. On saying good-bye to Dr. Sun at his house, I called him into his private library, and said: "I am leaving on this important mission without any definite instructions from you, and I would like to know here in private just what you expect me to do in the matter of commissions. Do you want any sums set aside for you or the corporation in any terms that might be negotiated"? Looking me squarely in the eye, he replied, "I expect you to obtain the lowest terms that you can for my country. I do not want one cent set aside for myself or any member of this corporation." And stretching out his hand, he said," Good-bye. I place my honor in your hands."

Dr. Sun Yat-sen is entitled to this breach of confidence on my part, made necessary by the vicious campaign waged by political enemies to discredit him. To me, he will always remain a true patriot, who, despite his faults, would probably make a most excellent president of China.

He is a man of ideals. When President Wilson withdrew his support to the American group in 1913, and thereby destroyed the possibility of financing his railway scheme, ruining his chances of accomplishing anything in this line, at his request, I personally visited the White House and thanked President Wilson for and on his behalf for adherence to principles that defended the ideal of democracy in China. Dr. Sun saw his pet scheme destroyed, yet he was man enough to swallow his defeat and rejoice in the attitude of President Wilson which preserved his greater ideal from the menace involved in handing over to Yuan Shih-kai the millions that he sensed would be utilized in hounding the parliamentarians into exile.

If the powers unite to support a limited republican form of government in China that would educate the people gradually to a fuller conception of their responsibilities, Dr. Sun Yat-sen is entitled to all just consideration. The republic was his work. He stepped aside and surrendered his hope of reward in 1912 and acknowledged Yuan as president in order to bring peace to his people. He refused to bring further bloodshed and suffering on the nation in order that he might personally benefit. His renunciation of the presidency at the zenith of his popularity and power stands unparalleled in modern history as an example of self-sacrifice. His solicitude for the people is better told by repeating what his wife once confided to me. She said: "I do not know how we can get along and make ends meet at home. "Father" allows us . . . (a modest sum) for household expenses, but every old soldier who fought with or for him at Nanking and is now in hard luck, and every soldier's widow who needs help, all come here for assistance, and father never turns them away. They all get something, and by the end of the month, we are always in debt for the house-

hold expenses." This is the real picture of Dr. Sun Yat-sen, a man's man, worthy of the highest respect and confidence.

Unfortunately, his many enemies have steadily and skilfully undermined his reputation by malicious slander and questionable propaganda, and there now seems little hope that he will be permitted to attain any prominence in the final adjustment of the Chinese puzzle that he does not impose by the force of arms.

The conflict in China is not only one between North and South, the military against the parliament, but one with all the earmarks of the monarchy against the republic. The final decision as to the nature of a permanent government in China may be made by the northern militarists proclaiming a restoration of the monarchy, with the forces of Chang Tso-lin and Tsao Kun standing behind the little emperor Dr. Sun Yat-sen declares that he will, in time, come North and crush Marshal Chang, who, he alleges, is in the pay of Japan and conspiring to overthrow the republic. There is little doubt that Chang is friendly to Japan. He has good reason to be, for apart from any accusation of being in Japan's pay, he derives his great prestige from a province made immensely prosperous by Japanese enterprise, a never-ending source of revenue which enables him to pay his army and dominate the government. If Dr. Sun's information is correct, we would have another complication tending to postpone unification of the country, under a republican form of government and make more urgent a common understanding on the part of all the powers as to what form of government they will support. It seems hardly probable that any solution can be arrived at before the opening of the Pacific conference in November, and the powers, once more, as at Paris, must deal with the representative of a divided China.

Just to complicate matters a little more, reports from Tokyo now state that, if China attempts to bring up the Shantung question at the Pacific conference, Japan will at once insist upon the unification of China, or, recognize the Southern republic. If this report is true, we have here a possible solution to a situation that would relieve Japan from all charges of imperialistic designs upon China, force America and Great Britain to declare themselves on the issue of democracy in Asia, and compel young China to come out into the open. If Japan should take the lead in recognizing the South, the United States would be hard pushed to find reasons why it should not promptly follow.

This might, after all, be the best solution to the difficult problem of China, at least, the powers would then be dealing with an honest president who they could well afford to back financially. We are inclined to believe, that Dr. Sun as president of China, would not hesitate to take drastic measures in order to enforce honesty in the handling of public moneys.

There are more reasons than one why such a solution might be the key to Pacific peace and do more towards bringing about a good understanding between Japan and America than anything else. It has long been evident that the tension between Japan and the United States is maintained by propaganda emanating from and paid for by Peking. Recognition of the South by Japan might be one way to bring about a termination of these pernicious activities, which, if persisted in, must continue to widen the breach between Japan and America. There is food for much thought, from the American point of view, in this solution.

It is a foregone conclusion, however, that such a solution will be bitterly opposed by other elements in China as inimical to their interests, and especially by the "old Guard" in North China who stand in a solid phalanx defending the government at Peking. If, however, Dr. Sun could provide satisfactory guarantees to the other powers that he would go slow and educate the Chinese people gradually in the ways of self-government and so contribute to decreasing the tension in other parts of Asia, there seems no good reason, why, under proper guidance, Dr. Sun would not make an acceptable ruler to all interested powers.

It goes without saying, that if matters are permitted to drift, the powers, sooner or later, will be faced with a crisis that will compel them to take decisive action. The North seems to lack a competent leader. The South is swinging around solidly in favor of Dr. Sun, and if Peking is determined to keep Japan in a constant state of international unrest, and the latter in self-defense recognizes the Southern republic, then the world will have to face stern realities and follow her lead. Viewed dispassionately, and with all due allowance for the opposition of other interests, such a solution would promptly terminate many questions that now serve as a source of irritation between Japan and America, and bring these two peoples closer together for the maintenance of Pacific peace.

A radical change has come over Japan in the past year. Each day, each month sees the ascendency of the liberal element in that country. The Japanese people are now convinced that the military party stands between them and the good opinion of the rest of the world; militarism in Japan is giving way to liberalism, to democracy, and once these sensible people fully understand that this road leads to full harmony and co-operation with their great American neighbor, and make for a permanent peace in the Pacific, we can expect them to work with America for the establishment of a similar government in China.

And here perhaps, we have the Japanese answer to the opposition to the renewal of the Anglo-Japanese alliance, her move to perpetuate peaceful relations with the United States. If Japan recognizes the South, and stands ready to support it against the North, the American people will see in this positive proof of the good-faith of the Japanese liberals, and the government at Washington would be compelled to follow her lead. Such a move would firmly establish Japan's position as the friend of China and take the ground from under the opposition of the students and other bodies who have been accusing her of aggression.

G. B. R.

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Sun Yat-sen: An Appreciation

UNFORTUNATELY for Dr. Sun Yat-sen he seems to have incurred the deep hostility of elements in China which cannot be altogether explained away by the favorite charge that he is a dreamer, impractical, and socialistic in his views. Such charges might have been sufficient to discredit him ten years ago. To-day they lack force. This antagonism is strikingly set forth in a letter written by Mr. G. Woodhead, editor of the *Peking and Tientsin Times* to the *Morning Post* (June 8), in which he protests against the undue prominence given to the election of Dr. Sun as "president" of China by the "so-called parliament," and concludes by saying:

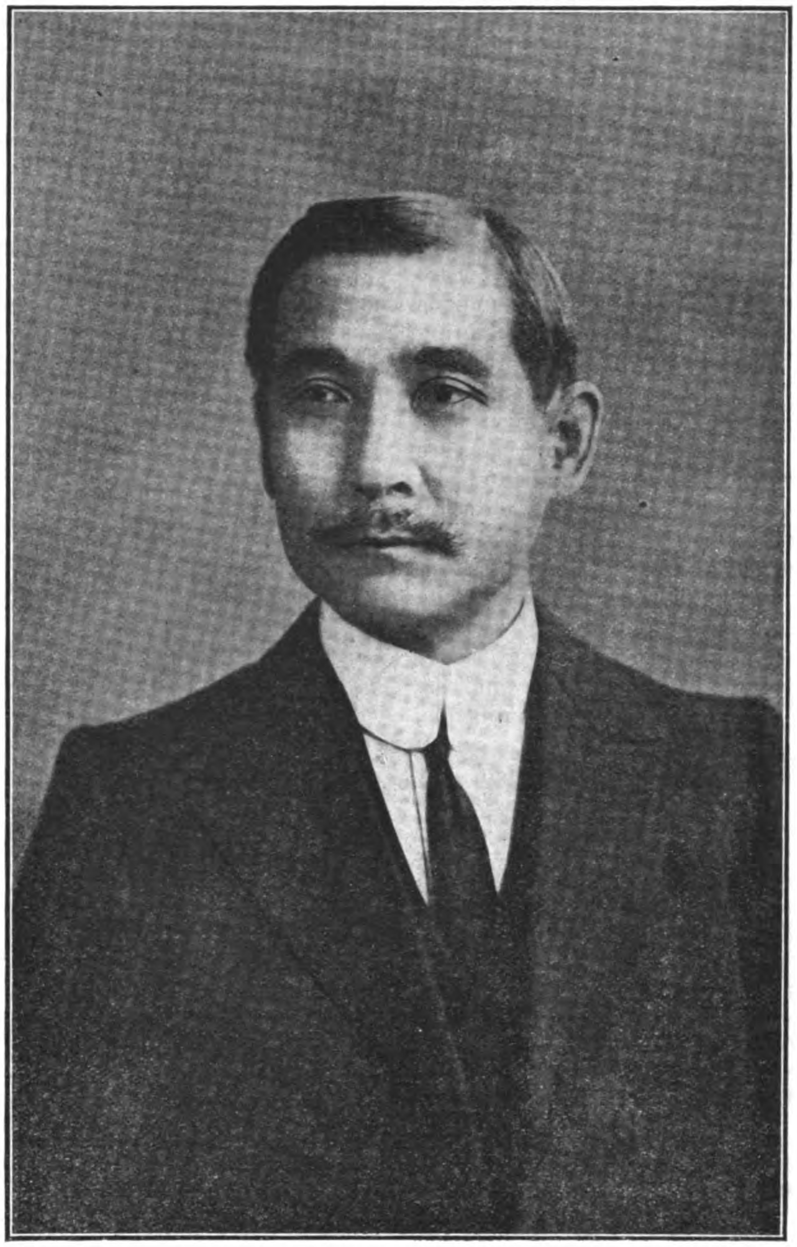
"Sun Yat-sen has still a certain following among the political agitators in China, but he has never given evidence of the least constructive ability. The 1911 revolution was virtually over before he reached China, and he had little or nothing to do with it. Under the republic his most notorious recommendations have been a scheme for the conquest of Russia (in 1913) and proposals for reorganizing Chinese currency by the unlimited issue of inconvertible paper notes."

The first sentence is an intentional slight, written by a journalist who edits the *China Year Book* and who should be thoroughly familiar with Dr. Sun's constructive scheme for a national system of Chinese railways, a scheme which Sir Charles Addis, the head of the British group, was willing to take over entire, and which was defeated by President Wilson's withdrawal of support to the American group. It ungenerously ignores the fact that as a result, British interests

were the sole beneficiary of Dr. Sun's scheme, bringing to them the Pauling contract for 1,000 miles of railway. It is a reflection on the character of Dr. Sun, in ignoring the great truth that this one contract is recognized by every banker and railway constructor in the world, as embracing the most favorable terms ever conceded by international finance to a foreign government. Mr. Woodhead derides Dr. Sun's scheme for "the conquest of Russia" in 1913, in reality, one for the recovery of Mongolia which had been boldly annexed by Russia the year previous. Impractical perhaps, but highly patriotic and commendable, proving that Dr. Sun was a man of spirit at least. There have been too many military *fiascos* since that date, for Mr. Woodhead to advance this argument in order to discredit Dr. Sun. His currency scheme, designed largely to finance the above campaign, *was the one project* that Dr. Sun made public over the protests of his associates, and brought upon him the criticism which has since served as the basis of the campaign to discredit his ability.

Mr. Woodhead has been consistently unjust to Dr. Sun, and in his *China Year Book*, which goes out to the world as the authority on things Chinese, ignores all mention of the Chinese National Railway Corporation and its constructive work which brought a thousand miles of new railway contract to British interests. Dr. Sun's great mistake consisted in engaging an American adviser, which Mr. Woodhead and his friends have never forgiven him for. DR. SUN YAT-SEN IS POSSESSED OF THE HIGHEST CONSTRUCTIVE ABILITY, AND, WHEN ENTRUSTED WITH THE WORKING OUT OF HIS SCHEMES, SECURED FOR HIS COUNTRY THE MOST FAVORABLE TERMS EVER CONCEDED TO A FOREIGN GOVERNMENT BY BRITISH FINANCIERS. IN EVERY RESPECT HE CONDUCTED HIMSELF AS A HIGH-MINDED PATRIOT AND AN HONEST MAN.

Civilization owes much to its dreamers. Dr. Sun dreams of mines and smelters, of factories, cities, ports and fleets, of railways and fields of grain, of houses and happiness. He dreams of a new China, the China of the engineer, the China that every foreign merchant, every foreign manufacturer, every foreign financier is hoping to see. He dreams of the China that is painted in such glowing colors by commercial attachés, consuls, diplomats, bankers, writers and others who see the immense latent possibilities awaiting the vitalizing influence of good government; the China that the consortium was organized to create and support, the China the world will be invited to invest in. He dreams of the China, that is impossible under further domination by military grafters and their sycophants. If the foreigner is in China for legitimate business and not for politics, there is more hope of his success under the rule of Dr. Sun Yat-sen than under any continuation of the farce upheld by the powers at Peking. If, on the other hand, the foreigner is in China for the propagation of ideals, if he desires to see these eminently practical people led safely along paths that will fit them for self-government, no one is more capable of doing this than the dreamer who for years labored for the realization of his dream as few men in the history of the world have labored for the attainment of their ideal.



Dr. Sun Yat-sen

An Honest Man, a Chinese Patriot. He Represents the Type that Must Lead China Forward to Her Place Amongst the Nations. Somewhat of an Idealist with Socialist Tendencies, He Stands for the Great Principle of Democracy or Parliamentary Government, as Opposed to the Grafting Rule of the Military Satraps, who Stole from Him the Fruits of His Work in the First Revolution. His great work for the Nationalization of China's Railways, was Destroyed by President Wilson in 1913, through withdrawing support from the American Group, at a time when his scheme was ready to be financed. He has recently been elected President of China by the Southern parliament at Canton. One of the anomolies of the Far Eastern situation lies in the fact that the Democratic Governments who fought Germany to abolish militarism, stubbornly uphold the worst type of predatory militarism in China, while opposing recognition to the leader of Chinese Democracy.

Dr. Sun is human. He has his faults. He has made many mistakes. He has been unfortunate in selecting friends who used him at the height of his popularity as a stepping stone to office or notoriety, and then betrayed, maligned and ridiculed him. Proscribed, exiled, hounded from pillar to post, first by the Manchus and then by Yuan and the northern militarists, his life has certainly not been a bed of roses. The crime of Dr. Sun Yat-sen in the eyes of the militarists and all who receive favors from their hands, is not that he is a dreamer, but his emphatic refusal to accept any compromise or acquiesce in any settlement which fails to admit the triumph of democracy, in refusing to submit to any terms which will perpetuate the rule of autocracy and consolidate a system which in a few months would again turn against him and undo the patient work of years. The worst enemies of Dr. Sun are the jackals of autocracy, the hirelings of the militarists, the half-baked crew of so-called republicans who deserted him to take office under Peking.

Whether we wish to admit or not, the stern realities of the situation compel us to see that Canton is each day looming larger and larger as the determining factor in the long-drawn out struggle in China. It is blazing the way for the suppression of autocracy, fighting against great odds for the realization of the dream for some form of constitutional government at Peking.

G. B. R.

An American Triangle in Asia

THE American people have just cause to feel pride and satisfaction in their president's selections for the diplomatic posts at Tokyo and Peking, and with the arrival of Col. Charles B. Warren in Japan and Dr. Jacob Gould Schurman in China, it remains only for President Harding to nominate Major-General Leonard Wood as governor-general of the Philippines in order to complete the triangle and make certain co-operation and co-ordination of policies in this part of the world that will adequately advance national interests. If some arrangement could be made whereby these three American representatives could work in full understanding it would not take long to overcome the ground lost in the past eight years of clashing activities on the part of our representatives in the Far East. Give us a policy that we can live up to, that we can work for, and expect to see perpetuated, and there will be no great difficulty in welding together into one harmonious whole the various discordant American interests now fighting each other all over the Far East. Give us an American program, one that will make for peace, harmony and concord in the Pacific, cut the *laison* with Peking, come out in the open with Tokyo, and then leave it to the Triangle to see that Americans are brought together for the sole advancement of national interests. If one group of Americans in China are to encourage an agitation that reacts upon the interests of other equally good and patriotic Americans in Japan and holds back the development of the Philippines, then there can be little hope for building up American trade and prestige in this part of the world.

What we heed in the Far East more than any thing else, is some program that will unite Americans in China, Japan and the Philippines, with consideration for each other's problems, and not a continuation of a petty, selfish, one-sided attitude, which attempts to penalize those who see things in a different light. It needs strength of character and leadership in a high degree to weld these discordant parts together, but it can be done with a proper policy, under the direction of such leaders as Wood, Warren and Schurman.

Schooled in great affairs, accustomed to responsibility, intimately acquainted and associated with prominent individuals of other nations for many years, the three new directors of American policies in Asia have much in common. Wood with his great executive ability, magnetism, cool judgement and general all-round fitness to administer, seated in his palace on the banks of the Pasig, should be the head of American policies in Asia, in constant touch with all developments.

Warren in Japan will be at the critical point of the other triangle made by Washington, London and Tokyo, the field manager of the most delicate international problem in the most agitated *foci* of world diplomacy as it affects the United States. He has had ample schooling, and as associate counsel in the celebrated Bering Sea case before an international high commission, and as counsel for the United States in 1910 in the North Atlantic fisheries case before the newly organized Hague tribunal, he carned the praise of the nation. Though a republican, the Wilson administration called upon him to prepare the national draft law, and awarded him a distinguished service medal for his fine work on the staff of the judge advocate general. He has the full confidence of the president, and according to those who know him best, is most reluctant to remain in the public service. Acceptance of the Tokyo post represents considerable personal sacrifice which he has made in order to serve the nation and the president.

It is the same in a larger sense with General Wood. His acceptance of the Philippine post can be made only at a sacrifice of other ambitions and hopes, for unless there is some settled policy that will permit him full scope to display and exercise his administrative and other high qualifications, he might as well be sent as minister to Dahomey.

Dr. Jacob Gould Schurman complements the other two. A great educator and a remarkably able man, he comes to China, not as a new theorist on political currents in this part of the world, but as one who has helped to set them in motion, one, who as president of the first Philippine commission, largely contiibuted towards creating problems that have now to be solved. He also served the nation as minister to Greece and Montenegro and has that experience in diplomatic and other problems that qualify him for the post at Peking. As president of Cornell University he has come in contact with many young Chinese now holding responsible positions under the republic. A friend of China, he is also, like all true and impartial Americans, a friend of Japan. He has spoken in high terms of Japan and shed light on her problems, and at the same time has not hesitated to express his views on the present state of affairs in China. He is a wise choice, the complement of the triangle, the assurance to Americans in all parts of the Far East, that the American legation will not become allied with any Chinese political party, that American policy as embraced within the "open door" doctrine, will serve as his guide. The friend of China, of Japan, Dr. Schurman's end of the triangle, will be as difficult as that of Col. Warren, and his effoits should be concentrated along lines that will tend to terminate the tension between these two neighbors through some sane and acceptable program.

Neither Wood in Manila, Warren in Tokio, or Schurman in Peking, can succeed, unless Americans in these three countries come together in some understanding to back them up

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Crooked Advertising Practices

THE American commercial attaché at Peking has submitted a report to the department of commerce on the irregularities surrounding the expenditure of the advertising appropriation of American manufacturers by their representatives in China.

Our knowledge of this document comes from the *Detroit News* (May 29) which says:—

"SHARP BUT CROOKED."

"Charges of advertising irregularities in the Far East, made by the American commercial attaché at Peking, are of sufficient importance to command the attention of every American manufacturer exporting to the Orient.

"In a general way the attaché indicates that 'American manufacturers and exporters in China, in making allowances to their agents for local advertising purposes, are not receiving the consideration which their expenditure should warrant.'

"The trouble begins with the necessity, due to the language barrier and lack of knowledge of Chinese tastes and business methods, of the American concern dealing through agents or representatives. The American manufacturer, the attaché indicates, is not well informed of marketing conditions in China and when he authorizes local advertising on a fifty-fifty basis he is badly dealt with.

"Two chief methods are involved in bleeding the American concern: first, there are outrageous commissions; and second and worse, the agent often procures from the favored advertising medium double rate bills, one of which is sent to the American manufacturer and the other, a smaller one of course, is kept by the local agent.

"In the United States, where advertising is a business and has reached a high plane, this seems strangely incredible. Yet the American official, whose business it is to observe just such things, and can have no other object than the service of his countrymen, insists these things are so, that the agent wo ks always to build up a personal little monopoly, and that his methods include double billing, rebating commissions through a dummy, usually a minor employe, charges for services not rendered and other irregular practices long discarded in respectable business circles.

"The demand for American products is so large in China and the opportunities for extending this business so splendid that the American manufacturer certainly cannot afford to see himself swindled at the outset. No one denies an abyssmal ignorance of Chinese methods and Chinese character, and doubtless every land has its unscrupulous citizens. But if American opportunity is to bear full fruit in the Orient it is highly important that the barrier of misunderstanding be removed, and removed as speedily as possible."

We might supplement the above with some of our own experiences, but are firmly convinced that it would have little or no effect on the manufacturer or modify by one iota his advertising policy.

The Pacific Conference

The Road to Good Understanding

UNDER the above title, THE FAR EASTERN REVIEW issued a call for a Pacific conference in March last. We sensed then that the end of the road had been reached, and asked President Harding, "which way do we turn" ? "Peace in the Pacific will never stand the strain of another attempt to convert an international conference into a court for the trial of Japan. She has a case, one that must be heard. Let us be fair to China and just to Japan. Let us get together and permit the cases of these two countries to go before the world. Then and only then, will we be able to see behind the screen of secret and confidential propaganda and the arguments of selfish and special interests, and behold the road that must be followed in the future."

President Harding has answered by calling upon the powers to participate in such a conference.

Through the American chargé d'affaires in Tokyo, the Japanese government was informally asked whether it would be agreeable to them to receive an invitation to participate in such a conference to be held in Washington with a view to discussing the limitation of armaments. It was suggested at the same time that the question of the limitation of armaments being related to the Pacific and Far Eastern problems, it would be appropriate that the proposed conference should also embrace a discussion by the interested powers of all Far Eastern questions and that China be invited to participate.

On July 10th an informal proposition of the above tenor was also made to the four powers heretofore known as the principal allied and associated powers in which President Harding suggested that in connection with the limitation of armaments the powers especially interested in the Pacific and Far Eastern problems should undertake the consideration of all matters bearing upon their solution with a view to reaching a common understanding with respect to principles and policies in the Far East. China was also invited to take part in the discussion relating to Far Eastern problems.

The Japanese government replied on July 13th and declared its intention gladly to accept such an invitation. As for the discussion of Pacific and Far Eastern problems, the Japanese government, considering it more expedient, for the purpose of facilitating the attainment of the object of the conference, that the character and scope of these problems should first be defined before expressing its views in this respect, and requested the government of the United States to inform them of the views on that phase of the matter.

After a frank exchange of views the following communication of the American government was conveyed to the Japanese government on July 3rd :—

"The government of the United States deeply appreciates the readiness of the imperial Japanese government to accept the invitation to attend the conference on the limitation of armaments.

"The secretary of state of the United States, in the course of informal conversations with his excellency, the imperial Japanese ambassador at Washington, has expressed the hope that the imperial government would not press its enquiry as to the nature and scope of the Pacific and Far Eastern problems to be discussed at the proposed conference in view of the fact that it is desirable that the full acceptance of the invitation of the American government leave this matter open for adjustment in the precise agenda to be arrived at later.

"The secretary of state is willing to proceed with exchanges of opinion regarding the agenda prior to the meeting of the conference. He considers it inadvisable, however, at the present moment to hamper the program and in particular to delay the arrangements for the conference pending an agreement regarding this matter."

Accordingly, the Japanese government, sent the following reply to the American government on July 26th, expressing their intention to participate in the proposed international conference, and stating at the same time their views in regard to the nature and scope of the problems to be discussed :—

"The Japanese government have taken note of the contents of the American memorandum of July 23rd, received through the American chargé d'affaires, in reply to the Japanese memorandum of July 13th on the subject of a conference on the limitation of armaments to be held at Washington.

"It has been brought to the knowledge of the Japanese government that the government of the United States is willing to proceed with exchanges of opinion regarding the agenda prior to the meeting of the conference and that it considers it advisable to adjust in that agenda the nature and scope of the Pacific and Far Eastern questions to be discussed at the proposed conference. The Japanese government, on that understanding, are happy to be able to inform the American government that it is their intention gladly to accept an invitation for a conference which shall embrace the discussion of the Pacific and Far Eastern questions.

"The Japanese government have been made aware through the communications and the published statement of the American government and the conversations between the secretary of state and Baron Shidehara that the proposition of the American government to discuss the Pacific and Far Eastern problems is based on the close bearing they have on the question of the limitation of armaments which is the original and principal aim of the conference and that, therefore, the main object of discussing these problems is to reach a common understanding in regard to general principles and policies in the Pacific and the Far East. Desiring, as they do, to contribute to the establishment of an enduring peace and to the advancement of human welfare, the Japanese government earnestly hope that the proposed conference may attain the expected results and their ideals may thereby be brought nearer to realization.

"In order to ensure the success of the conference, the Japanese Government deem it advisable that the agenda thereof should be arranged in accordance with the main object of the discussions as above defined, and that introduction therein of problems such as are of sole concern to certain particular powers or such matters that may be regarded as accomplished facts should be scrupulously avoided."

Although we hold to the opinion that a conference between the United States, Great Britain and Japan is the more practical way to arrive at an understanding over the limitation of armaments, yet when it comes to any discussion of Far Eastern problems, China must be given a seat at the table. Pacific problems that affect the peace of the world are largely centered in China and have been permitted to reach an acute stage simply because of the procrastination of these otherwise most practical people in agreeing amongst themselves as to some form of stable government.

Japan's hesitancy in accepting the invitation before she knew what questions would be brought up for discussion was to be expected after her experience in Paris, where the American and Chinese delegations attempted to convert the peace conference into a court for her impeachment. Peace in the Pacific will not stand another such strain.

There are many questions that can come before such a conference, but any understanding arrived at will not be worth the paper it is written upon unless based upon a unified China, with a government which can assume its full share of the responsibilities. As far as China and Japan are concerned there are undoubtedly many minor outstanding questions that serve as irritants, but Japan's position would seem to simmer down to a recognition of her economic and strategical interests in Manchuria and Mongolia Unless the powers and China can supply the necessary guarantees that Japan's interests in these regions will never be placed in jeopardy by invasion from the direction of Urga, it is a foregone conclusion that Japan will insist upon the right to provide her own guarantees. All this, in turn, hinges upon the recognition

of the accomplished fact embraced within the extension of the lease to the Liaotung peninsula and the Manchurian treaties of 1915.

Shantung is a minor question. That it has been allowed to overshadow all others is due to the fact that the pressure of public opinion in China will not permit the Peking government to enter into direct negotiations with Japan for its transfer. Japan has stood ready to comply with her pledged word for over a year, but the Chinese, acting under foreign advice, have stubbornly rejected all overtures to discuss the question. They say in effect "you promised to get out, well, keep your promise! We did not sign the Versailles treaty and cannot treat with you on the terms of that treaty." And so the irritating question has dragged along, Japan endeavoring to preserve her "face," with the Chinese as stubbornly determined that she shall lose it. In this position, the invitation of President Harding finds the two nations, wide apart as ever.

The clash of interests that will arise in the conference if the agenda is permitted to include all the questions between China and Japan must centre around Japan's position in Manchuria and the validity of the treaties arising out of the Twenty One Demands. Unless the greatest diplomacy and tact prevails, the conference may break up without accomplishing anything, and defeat its object. If a solution is not arrived at it goes without saying that the situation will tend to grow more and more tense with a sharpening of the issues followed by a renewed burst of war preparations. The Hague conference failed to bring about a common understanding, and materially contributed to precipitate the catastrophe of 1914. The war-makers will swarm around the conference, and make a supreme effort to precipitate a crisis. A determined attempt will be made to turn the conference into another tribunal for the trial of Japan. It will require all the cool courage and judgment of the most experienced diplomats to combat these forces. As we write this, the report comes that the American delegate to the conference will be Elihu Root. He is the one man for the job, the coldest, sanest, and cleverest American diplomat, the best qualified to guide the nation right on such a momentous occasion.

* * *

Denison, Morrison, Ohl

JUST when all the busybodies in the world are greasing the ways erected to launch Japan headlong into a war with the United States, and we are asked to believe that the Japanese look upon Americans with particular aversion and hostility, the Japanese parliament, which rarely votes the public money for ornamental purposes, has approved a bill appropriating a large sum to erect a monument to Henry M. Denison, an American, who for many years prior to his death in 1914, was the legal adviser to the Japanese foreign office.

Denison was the true type of adviser, modest, unassuming, retiring, rarely permitting himself to be thrust into the limelight, but always on hand behind the scenes, when any important move was made. He never attempted to take any credit, but there are those in Japan who do not hesitate to state, that he was largely responsible for that masterly foreign policy that elevated Japan in a decade or so to the front rank of world powers. The refusal of Denison to advertise himself, added to the natural reticence of the Japanese, has made it difficult to appraise the power which he undoubtedly wielded. The Japanese parliament has answered this question for us, and in voting the appropriation for a monument to this American, gives proof once more of its deep gratitude towards those who have stood with them during the critical years when they were emerging from obscurity. There has been no advertising of this appropriation, no attempt to invite the attention of the American people to this simple act of appreciation. It has all been done in the characteristic, quiet, dignified way that distinguishes Japanese methods.

China might well profit by the example of Japan, and indicate her appreciation of the disinterested work that a few foreigners have contributed to the advancement of her cause. There are many names which might be mentioned, but above them all stands that of Dr. George Morrison, the British journalist adviser, who died in harness, and the equally distinguished American journalist, who, as correspondent and then as editor of the *New York Herald*, did more for the cause of China in the United States than all the paid writers who in recent years have invaded the propaganda field. In Josiah Kingsley Ohl, who died last June, China lost one of her great friends one who used his position in American journalism to see that she received a square deal. He made China a front-page subject of American news and induced other prominent American editors and writers to take an interest in her problems. He was the pioneer. China is now deriving the benefit of his work, for if *The New York Herald* had not shown the way when it did, American newspapers would never have taken the interest that they now display in China.

A memorial to Morrison, and another to Ohl somewhere in Peking, would be a very small acknowledgement on the part of China for the great services these two journalists contributed, in their respective countries, to the cause of China. It is almost hopeless at this time to expect the Chinese government to actively interest itself in such a matter, but there are certainly enough public-spirited Chinese student's bodies, journalist associations, etc., that might start a movement for the collection of a fund for the above purpose. THE FAR EASTERN REVIEW will head such a list with a suitable contribution.

* * *

A Son of Mars

MR. Thomas F. Millard is on the war-path, living up to his reputation and getting back with a vengeance at the British who he holds responsible for his departure from China after his failure to direct the German march on Paris from his headquarters on Kiangse Road in the autumn of 1914. Wonderful campaign that! Millard simply closed his eyes and dreamed that he was the Napoleon of modern strategy, the Julius Snoozer of tactical movements, and the way he moved those little German armies here and there over the fields of Flanders, and announced his intimacy with von Moltke, von Falkenheim, and other German military celebrities, who had imparted to him in confidence what they would do to France and England when the day arrived, made the "contemptibles" feel mighty small in the presence of such brilliant generalship.

At the Peace conference, Mr. Millard went to sleep once more, and dreamed that Asia was divided into three great spheres dominated by Great Britain, France and Japan. He dreamed that he read the text of the treaty under which these powers had secretly agreed to freeze out the United States, and when he awoke, imparted this information to the world in a long dispatch to the American press. He wasn't going to let Great Britain put over any such frame-up on America and China. Not he.

He is now in London, and has had another dream. This time he sees war, close at hand, another frame-up on the part of Great Britain to make the United States and Japan fight. And again, he burns up the cables to tell President Harding all about it.

He declares excitedly that:

"The Far East situation is more ominous than I have ever known it to be. I regard war with Japan almost certain and rapidly nearing. A renewal of the old Anglo-Japanese Alliance will surely be directed against America. I am convinced the British government's policy in China is opposed to American policy and secretly works against our interests out there. My opinion is that Great Britain is purposely framing up a war between Japan and the United States."

Somehow or other this sounds strangely like other warnings that come from men, who, like Mr. Millard, pose as advisers of

sorts to the Chinese government. Mr. Lennox Simpson had us all scared to death not long ago about the inevitabililty of a war between Japan and America. This gentleman is also an adviser to the Chinese government. His companion, Dr. C. H. Wang, however, told the American people not to fear as China would certainly come to their aid. Funny how they all insist that America and Japan must fight, that war is inevitable, or, as one of the leading Chinese lecturers in the United States, put it: "the United States *must* fight Japan. Your honor is at stake ; you have gone too far to back out. If for no other reason, you must fight to protect your trade," and, trembling with excitement, he concluded, "*America must fight Japan*" ! ! This gentleman, strange to say, is also on the Chinese government pay-roll.

Some Americans express disapproval of the policy of THE FAR EASTERN REVIEW. We invite their attention to the above facts and add that we do not indulge in pipe dreams. We resent a propaganda, having for its purpose a continued agitation against Japan in the American press, which can only lead to strained relations or worse. American editors, unacquainted with all the ramifications of Far Eastern propaganda, are inclined to take Mr. Millard's activities as a joke, and prefer to believe that "he is talking through his hat." We simply invite their attention to the fact that Mr. Millard has been steadily on the war-job for over a decade. We have Mr. Millard's own testimony before the senate committee of foreign relations (when he declared war openly upon Japan and tried to involve the government by placing the words in the mouth of a high American official to the Paris Peace conference) that his expenses were paid by the Chinese government. When he was recently in China, the Peking papers referred to him as an adviser to the government, so the inference is that he is still on its pay-roll.

American editors may believe that he indulges in pipe dreams. THE FAR EASTERN REVIEW knows that he and his ilk are following a calculated and fixed program.

* * *

Bunk

THE great American concessionnaire, Washington D. Vanderlip, is back in the United States after another visit to Lenin for his Russian Development Syndicate, bringing in his pocket nothing less than the title in perpetuity to two important naval bases on the Pacific littoral of Siberia, and a concession covering 10,000,000 acres of spruce timber land which, he asserts, will, if properly worked, reduce the price of news print paper from 50 to 75 per cent.

One of the naval base titles is to is Avatcha Bay, at the southern end of the Kamchatka Peninsula. Russians, declared Mr. Vanderlip, have a saying that he who holds this bay controls the Pacific. Its extraordinary strategic importance, he said, is due to its being only twenty-four hours away from Alaska, back of Japan and two days from it, and impregnable as Gibraltar.

The second naval base, of which he declined to divulge the exact location and which he proposes turning over to the American government, lies near Vladivostok and is important for both coal and oil.

The 10,000,000-acre spruce concession is on the Murmansk coast, and one reason why it will so greatly reduce print paper costs is, he said, that pulp made from it there will provide cargoes for vessels returning to the United States from nearby ports.

The Japanese, Mr. Vanderlip said, are fast engendering opposition in both Russia and China. In Siberia alone 19,000,000 white people are bitter against them because of their aggressive policies, and a trade agreement with the United States would be welcomed and would bring most of the important business of that vast country to the United States.

Mr. Vanderlip is taking no chances this time, and comes prepared for war between Japan and America, with the bait to make the American government rise to his cast and the newspapers look to him as a benefactor.

"Russia and China," said Vanderlip, "have entered into a treaty designed to drive the Japanese from the Asiatic coast. An attempt will be made to force the Japanese out of Shantung as soon as Russia is able to furnish the Chinese with arms. That will be very shortly. Japan then will establish a formal blockade of the Chinese and Siberian coasts and it will be up to the United States to go in and break the blockade. That's how the war is going to start."

Mr. Vanderlip is certainly secretive and it intrigues our curiosity to locate that mysterious second great naval base that lies near Vladivostok, so important for both coal and oil. Funny that the Russians never discovered this great port before now, and went to all the trouble to grab Port Arthur from China and bring about a war with Japan in order to have an ice-free outlet in that direction. Bully good dope is all this that Mr. Vanderlip brings home with him. With the talk of an American naval base near Vladivostok and holding the "key of the Pacific" at Avatcha Bay, the Japanese general staff is probably very much excited. This finds its replica in the yarns circulated in the United States about Japan's seeking a naval base in Mexico. Great bunk !

* * *

100 Per Cent. Profits for Chinese

FREDERIC E. Lee, the United States economic consul at Shanghai, makes some interesting comments regarding the cause of the flow of gold from China to the United States, which began about the first of the present year, reversing the current for the first time in two years. Writing to the department of commerce, Mr. Lee points out that in 1919 China imported gold bars and bullion to the value of $79,295,738 United States currency. Fully as large a quantity was imported in the first seven or eight months of 1920, but at the end of that period the unsettled market conditions in the United States and the rest of the world virtually wiped out China's export trade, and its capacity to absorb the yellow metal ceased. When at the close of the year and in the days preceding the Chinese new year, February 8th, silver exchange dropped to 2 to 1 and below, two dollars Mexican for one dollar gold, the Chinese dealers began to take their 100 per cent. profit on their gold purchases and export began. From the port of Shanghai alone the exports to the United States between December 30, 1920, and February 21, 1921, amounted to approximately $10,000,000 gold.

The principal cause for this export of gold is that it is an exchange transaction in which the Chinese dealers have made large profits. Much of this gold was purchased when $1 Mexican would buy $1.14 gold. A second cause for this export is that with the stoppage of export and the impossibility of consignees accepting imports because of the unsettled conditions, less gold is required by the foreign exchange banks in handling foreign exchange transactions, so the surplus is being sent to points where it is more readily convertible.

* * *

The Japanese Engineer

WE have heard much loose talk about the inferiority of Japanese products, of the flimsy character and lack of efficiency of their machines, in fact, all the usual criticism which befalls the lot of a new nation entering the world's economic field or a new firm who starts in to compete with an old established one. The new-comer always has his faults. There are many explanations to account for the backwardness of the Japanese engineer and his alleged lack of efficiency, but is has remained for R. Torokai, professor of electrical engineering in the Imperial University of Kyoto, to plead the cause of his countrymen in a manner that

must be received with sympathy and understanding by engineers of other nations. As an introduction to an article in *The Times* on the development of the Electrical Goods Industry in his country he points out that "Speaking generally, the electrical goods made in Japan do not stand comparison with the products of foreign countries, and the frequent criticism of the crudeness of these and other manufactures of Japan calls for some explanation. As a rule this defect is ascribed to lack of scientific research. Of course it is true that in all branches of science the same progress has not yet been made in Japan as in Europe and America, but personally I do not think that this alone accounts for the inferiority to which I have referred. In my opinion Japan has already made sufficient advance in scientific investigation to meet her industrial needs, and progress in this direction is constant and continuous. There is one factor that must not be overlooked in considering this question, and in approaching it we must ask for the intelligent sympathy of all foreigners.

"Japan is a remote country, situated at a considerable distance from Europe and America. She has been practically isolated for a period of 2,000 years, during which Western nations have exercised but little influence upon her economic development, and consequently the Japanese have developed a civilization peculiarly their own. During this long era of isolation they made noteworthy and valuable progress in moral science and the fine arts, but natural science and its applications were neglected. And it must not be forgotten that until quite recently the pursuit of business, trade and commerce, was despised and regarded with contempt in Japan.

"The result of this eremitical development was that, when Japan about 50 years ago began to enter the comity of nations, she could boast of few of the common products of industry and commerce, except silk fabrics and woven art fabrics. She had practically nothing to contribute to the commerce of the world, because all her products were entirely different from those in demand and common use in other countries. Further, when some 50 years ago Japan decided to take her place in and contribute to the economic life of the world and to devote herself to the study of modern science in all its branches, she had to overcome many difficulties.

"For example, there were the obstacles connected with her language, which has nothing in common with those of Europe. Accordingly, to prepare themselves for scientific studies and research work it is necessary for Japanese students to spend more than five years in learning foreign languages. In the middle schools, as a matter of fact, the majority of the hours are devoted to English lessons, and this must needs be if Japan is to take her place in the comity of nations. Japan wants to be numbered among the great scientific nations of the world, and to this end she is prepared to strain every nerve. To accomplish this she would not hesitate indeed to reform and modernize the language of her ancestors, and the present generation would be willing to spend a considerable proportion of its life in acquiring those foreign tongues which are a necessity in these modern days.

"Again, it must not be forgotten that until about half a century ago there were no Japanese workmen trained in modern industries. All Japan's skilled artisans of to-day have been trained during the last 30 years. This fact must be borne in mind when comparing them with their fellowworkers in Europe and America, who have the benefit of generations of skilled training behind them. An appreciation of this truth would lead to less criticism on the part of foreigners of the inexperience of Japanese workmen. The defects of some Japanese goods are largely due to this lack of experience, not to any set policy of deliberate deceit. For myself, I strongly believe that with her increasing ability to supply articles of the highest quality Japan will be able to make her contribution to the world's industry, and the nations generally will forget the mistakes of the past as they realize the tremendous obstacles which have had to be overcome and the economic youthfulness of Japan."

Reiterating the Hay Doctrine

The Wireless Muddle

THE Harding administration has reiterated unequivocally the doctrine of the "open door" in China. The statement of the position of the government arises out of the protest made by the British, Danish and Japanese governments over the contract with the Federal Wireless Telegraph Company to erect wireless stations in certain parts of China. The history of these contracts was published in the June number of THE FAR EASTERN REVIEW. It appears that the Chinese government through Minister Sze asked Secretary Hughes on June 9, whether he contemplated withdrawing support to the wireless telegraph company, and on July 1, the secretary replied as follows:

"I have the honor to acknowledge the receipt of your note of June 9, and in reply assure you that it is not the intention of this government to withdraw from the position hitherto taken by it in support of the rights accruing to the Federal Telegraph Company under the contract of January 8th last.

"In its view, the communications which it has received from the other interested governments, in reply to its enquiries as to the reasons for their protests to the Chinese authorities against this contract, tend only to confirm this government in its belief that the adverse claims which have been urged as excluding the Federal Telegraph Company from participating with the Chinese government in establishing wireless communications are founded upon assertions of monopolistic or preferential rights in the field of Chinese governmental enterprise, which cannot be reconciled either with the treaty rights of American citizens in China or with the principle of the open door.

"Your reference to the principle of the open door affords me the opportunity to assure you of this government's continuance in its wholehearted support of that principle, which it has traditionally regarded as fundamental both to the interests of China itself and to the common interests of all powers in China, and indispensable to the free and peaceful development of their commerce on the Pacific Ocean.

"The government of the United States has never associated itself with any arrangement which sought to establish any special rights or privileges in China which would abridge the rights of the subjects or citizens of other friendly states; and I am happy to assure you that it is the purpose of this government neither to participate nor to acquiesce in any arrangement which might purport to establish in favor of foreign interests any superiority of rights with respect to commercial or economic development in designated regions of the territories of China, or which might seek to create any such monopoly or preference as would exclude other nationals from undertaking any legitimate trade or industry, or from participating with the Chinese government in any category of public enterprise."

The above note must, however, be read in connection with a former warning of Secretary Hughes to the Chinese government that any cancellation of the American wireless contract would be considered by the American government as an unfriendly act. This served notice on China that she must accept responsibility for acts which tend to convert the Far East into an international cockpit.

Nothing could be clearer or more emphatic than the American stand. It is a warning to the other powers and to China herself that an end must come to contracts and concessions which violate the spirit and letter of the "open door" doctrine. The American government was placed in a dilemma through the signature of the wireless agreement which conflicted with previous contracts entered into by the Chinese government (of its own free will) and closed the door to others.

The reiteration of the traditional American policy may mean much or little. There was nothing else for the American government to do but enter its protest against any contracts held by other nationals which in any way operate against equal opportunity for American interests. In view of the fact that the American protest is directed against a combination of three powers, it resolves itself into the reaffirmation of a principle violated, not only by foreign interests, but by the Chinese themselves. There is little danger that any serious consequences will arise over this dispute, but it places on record once more, a fact that China herself will have to take to heart, which is, it is impossible for the United States to maintain a doctrine designed for the protection of China and American trade, when the beneficiary of the doctrine, consents to its vitiation without protest. In other words, it says, in effect, that the American government will henceforth refuse to recognize any contract which may be entered into voluntarily by

the Chinese government, which in any way infringes the principle of equal opportunity. The American note is therefore double-edged. It works both ways.

The difficulty with the wireless contract arises however not so much from the opposition of the British, Japanese and Danish interests, but from the difficulty experienced in raising the loan on the strength of the security set aside to guarantee the interest. It is not a question of diplomacy but of finance and credit. We are reliably informed, that notwithstanding the diplomatic support of the state department, the American group declined to finance the undertaking. Here we find a typical example where the consortium is working in complete harmony as an international brake on matters that might easily lead to misunderstandings and charges of bad faith.

As the Japanese group is scrupulously playing the game with the American, British and French, so we have here an instance proving that the American group is also loyal to its partners. The consequence is that the American telegraph company has had to seek a loan outside the American group, and encountered difficulties because of the inadequacy of the security offered. The original agreement between the Chinese government and the American Federal Wireless Telegraph Company obligated the former to contribute one-half of the funds necessary for construction purposes, and the latter were to find the balance. The earnings of the system were to be applied first, to the payment of interest and sinking fund on that part of the capital furnished by the company, and only after this had been provided for could any part of the earnings be applicable to the Chinese half of the obligation. As we understand the circumstances, the bankers requested the contractors to furnish them with some guarantee other than the earnings to secure their share of the loan, and the Chinese agreed to allocate the surplus revenue of the posts and telegraphs for this purpose. It appears, however, that the surplus revenues of the telegraphs are already allocated to the service of previous telegraph and other loans, and the only tangible asset is the revenue from the posts, a rather dubious one.

Under such conditions, the continued support of the state department means nothing further than a reiteration of general American policy. The real stumbling block seems to be financial, with the consortium banks standing firmly together to put an end to international competition calculated to create discord, and the Chinese government unable to furnish suitable guarantees that would permit an independent banker to safely finance the undertaking.

* * *

The End of a Great Work

IN response to the appeals on its charity America contributed $7,250,000 for Chinese famine relief, according to a statement made by Mr. Thomas W. Lamont, chairman of the American committee for the China Relief Fund. The cost of collection was little more than three per cent. or within the original estimate. The quick generosity of America, in addition to funds that poured in from other countries, has resulted in the saving of millions of lives. In emphasizing these points Mr. Lamont states:

"1. In the Chinese famine of 1907 America's contribution can be very roughly estimated at not more that $750,000. For the present famine the total American contributions amount to $7,250,000. The total h s been made up to $4,542,996 collected by the committee and sent direct to China; $250,000 contributed by the Chinese in America; $1,355,563 sent direct to China through various church agencies; $1,106,000 contributed by the Red Cross. In addition the president of China has reported that contributions in China from the government famine relief bureau, the national relief society, the provincial governments and other charitable organizations, excluding the proceeds realized from the loan secured by surtax on imports, have totaled about $6,000,000.

"2. The total cost of the committee's campaign as of May 31st, 1921, has been less than 4 per cent., and if the gifts reported by the other bodies be included the cost, will only slightly exceed 3 per cent.

"3. Any available funds still on hand and any further contributions will, if a feasible program can be devised, be devoted to the study of methods to prevent future famines. This question the American advisory committee in Peking has for some time been studying.

"4. A copy of this informal report is being forwarded to ex-President Wilson, who last December named the original American committee, and to President Harding, who last March issued a public appeal in behalf of the work."

* * *

Japan Plays the Game

IT seems that about once a month some sober-minded leader of public opinion in the United States is called upon to publicly give the lie to the ever recurrent slanders set in circulation about the honesty of the Japanese. At least four times within the past few months, Mr. Thomas Lamont, as chairman of the consortium, has publicly disavowed statements emanating from China about the bad faith of the Japanese bankers. Most of this misunderstanding is traceable to the news items in the Chinese press about the recent activities of Mr. Ono in Peking in renewing the Nishihara loans with some tangible security. These loans have nothing to do with the official Japanese group in the consortium and are not included in the scope of that understanding. Whatever terms may be arrived at by Mr. Ono on behalf of the three semi-official banks who made these loans has nothing whatever to do with the attitude of the Japanese group. The loan for the Kirin-Kwainei Railway and the extension of the line from Chenchiatun to Taonanfu is also outside the scope of the consortium, and Japan is quite at liberty to proceed with negotiations with the Chinese government for the financing of these lines without in any way conflicting with the objects of or the understanding of the consortium. These reports, originating in China, were revived recently when Mr. Frederick W. Stevens, the American group representative, returned to America to enjoy his summer vacation. His arrival was construed in some quarters as meaning the end of the consortium and the ascendency of Japanese interests in China.

At a gathering of Americans and Japanese at the Lawyers' Club in New York given by the Japan Society in honor of the Japanese parliamentary party now visiting America, Mr. Thomas W. Lamont again took advantage of the opportunity to testify to the good faith of the Japanese group. He said:

"To Americans visiting Japan the hospitality of our friends there is so gracious and so generous that it dwarfs our efforts here, rendered somewhat meagre by reason of the rush and whirl in which we live. I must beg our visitors not to believe that our regard for them is as limited as the time that we place at their disposal.

"My own recent visit to Japan was made in the effort for co-operative action for the benefit of China. One result of the organization of the consortium for the assistance of China was the formation of this partnership among the investment interests of America, Japan, England and France, and it is certain that if that partnership is to function it must be based upon complete confidence on all sides. Mischief makers are constantly stating that they have reason to believe the Japanese banking group is not playing fair with us. I have denied, and am glad here to-day to deny again, any such report. The Japanese banking group is playing the game as fairly as the groups of America, Great Britain and France.

"The chairman of the Japanese parliamentary committee has made one very significant statement to us. He has said that as a result of the momentous events of the last few years a change has come in opinion in Japan—a change not less important than that in many other countries of the world. The chairman has said to us, in effect, that the Japanese people are convinced that militarism is no longer to rule the world and that the Japanese people are not to be persuaded to militarism by any group or clique in their country. This is indeed a statement welcome to all lovers of peace in America and throughout the world. Now, the chairman of this distinguished Japanese delegation states that those ancient memories are henceforth to be put into the background and that Japan is to address herself to a triumph of a new order.

"There are to-day between America and Japan questions, some of them of small, some of them of great, importance, but none of them so serious that they cannot be settled if we sit down on both sides of the Pacific in the same spirit and in the determination, first, to know all the facts and to know them without distortion or exaggeration; next, to discuss those facts with tolerance, understanding and sympathy on both sides. If our Japanese friends will join America in such a program, then indeed we may look forward confidently to a continuance of warm friendship between these two great peoples, separated only by the fast narrowing measure of the Pacific Seas, and to maintenance with Japan of a joint determination to maintain the peace of the Far East."

The Lesson of the Tenders

THE opening of the tenders for Chinese railway rolling stock and construction of the Yellow River Bridge which resulted in the awarding of the majority of the contracts to Belgian manufacturers will have a far-reaching effect. The Belgians won out against the competition of the industrial world. They won on their merits and no honest competitor can feel resentful or begrudge the legitimate rewards of self-sacrifice and hard work. Their success, however, must compel a radical readjustment of ideas and an awakening to realities. Especially must it compel serious thought amongst the consortium powers, whose original program contemplated the advancement of railway and industrial loans to China without strings for the supply of materials. These were to be purchased in the open market, that is, by public tender amongst the manufacturers of the consortium nations, Great Britain, France, Belgium, Japan and the United States, with preference to materials manufactured in China. It was a beautiful program, devised by theorists who held firm to the belief that American trade supremacy gained during the war would last for many years, enabling our manufacturers to hold their own in any competition with the broken-down industries of Europe. It was thought, that the European manufacturers would be so busy supplying the needs of Europe for the next ten years, they could not actively compete in foreign fields, and, therefore, there was no necessity for any loan terms that would guarantee to American manufacturers their fair share of the orders for materials. In the March 1920 number of THE FAR EASTERN REVIEW, we entered a protest on behalf of American manufacturers who, we felt certain, could never compete with British, Belgians, French and Japanese as soon as they were prepared to re-enter the foreign field. It will certainly bring little profit to the American manufacturer, or, the manufacturers of the other consortium nations, if they are to provide loans to China, and then enter into cut-throat competition for the orders. American money will never flow into China under provisions which will divert it to Europe for supplies which furnish employment to European labor, while there are millions of men out of employment in the United States or vice-versa.

The idealists of the past administration severely condemned THE FAR EASTERN REVIEW for its outspoken defense of material American interests. Well, nearly two years have passed. The consortium as yet has made no loans to China, but we hazard the prophecy, that whenever such a loan is made for the construction of Chinese railways, the American manufacturer will demand from his government that the contract will contain some provision that will guarantee to them a proportionate share of the orders for materials. Idealism will give way to materialism in business.

* * *

Dangerous Propaganda: Its Aftermath

"It has come to the attention of the bureau of foreign and domestic commerce, that the prospects for the successful sale of American merchandise in China by newly established American exporting firms is not infrequently seriously impaired by the meager knowledge of trade conditions peculiar to the country, and the discountenance of the special requirements of the market on the part of the foreign representatives sent to this field. In this connection it is pointed out that the tendency will appear among Chinese merchants to refuse negotiations with Americans who are not long established firms in China, unless they are convinced of the reliable standing of the new firm and of courteous and thorough treatment given orders placed with it."

This has been culled from *Commerce Reports* because it emphasizes the views expressed in the article "Dangerous Propaganda" printed in the July issue of THE FAR EASTERN REVIEW.

Shipping Cotton Mill Machinery to China

THE heavy shipments of cotton machinery from England to the Orient recently reported in the *Manufacturers Record* are being followed by large shipments from New England to China. The *Boston Transcript* reports the recent shipment of a complete outfit for a 20,000 cotton spindle mill to be built in Shanghai, and the statement of Richard Bogner, traffic manager of the Wah Chang Trading Company, that this is the first of seven mill equipments to be shipped from Boston.

China Trade of New York, a paper founded by Chinese cotton merchants, reports the proposed construction at Canton of a new cotton mill capitalized at $2,000,000, the chief aim of the project being to manufacture goods for Chinese consumption.

The development of the cotton growing and cotton manufacturing industry in the Orient, now proceeding on so large a scale, should be welcomed by all lovers of humanity and civilization.

Some years ago New England was greatly alarmed for fear that the development of the cotton mill industry of the South would destroy its textile interests; while there were supposedly broad-minded business men in the North and West who were decidedly opposed to the industrial development of the South, fearing that the growth of this section would retard the advancement of their sections.

Against such a narrow sectional view for the United States the *Manufacturers Record* has always protested. It insisted that New England should not become alarmed at the rapid development of cotton manufacturing in the South; that there would be room enough in the country for all of the industrial activities which might be created; and that though New England might have to shift its trade perchance to finer goods, or to other lines, the South's development would enrich New England and the whole of the United States.

It believes that world affairs should be looked at from a somewhat similar point of view. If the development of cotton growing and cotton manufacturing in the Orient can add to the prosperity of the people of that part of the world then all lovers of civilization should rejoice in every evidence of progress which would advance the prosperity of China and India and other Oriental countries.

The world is enriched, humanity is advanced, civilization is made safer as employment broadens throughout the world and prosperity increases. That is the basis upon which all the business difficulties of the world should rest, except when it comes to the point of the punishment of criminal nations and criminal individuals who violate all human and Divine laws. They should be justly punished and made to bear the burden of the penalty of their crimes.

* * *

Bully Boy! Belgium

THE only road to success lies through hard work. Little Belgium is once more proving the truth of this fundamental principle. While England and the United States are torn asunder by labor troubles, sunk in the depths of a trade depression with business carried on at a loss and production at a standstill, Belgium looms up larger and larger as an example of industry, thrift and commercial foresight. Belgium's rapid recovery is traceable directly to her recognition that work, industry and manufacture are the true foundations of prosperity, and that the possession of great wealth, unlimited resources and tremendous manufacturing plants, are of little profit to a nation unless the worker is willing to co-operate and supply the energy that will convert these into a real asset.

The story of Belgium's recovery is fully told in a special report to the department of commerce by Commercial Attaché Cross.

"He describes at length, Belgium's foreign investments, amounting to 501,500,000 francs capital. Money this was which went into railway and industrial shares in Argentina, Brazil, Egypt, Canada, Mexico, China, Africa and America. Money invested with such skill that when the withering blast of depreciation hit Belgian currency and sent it tumbling to a quarter of its par value the foreign holdings of thrifty Belgian savers stood up like a rock. These holdings formed a bulwark on which to begin Belgian reconstruction, a bulwark as stanch as if the investments had consisted of reserved gold francs locked safely away in the government vaults.

"In more ways than one these foreign investments gave Belgium something to build upon. Attaché Cross says that 'to every young or undeveloped country of which the rich natural resources were judged capable of ultimately returning the initial investment with a profit Belgian surplus capital has been sent to promote real estate improvements, agricultural operations and building construction, or simply to participate in local enterprise.' And he said:

"'The zeal of Belgian capitalists in opening such fields has its origin in the nation's need for foreign purchasers to sustain its home industries, and foreign trade statistics amply show that, aside from the adjacent countries in Europe, the most active markets for Belgian manufactured products have been those sections in which Belgian financial interests have gained a firm foothold At the same time Belgian financial interests in countries producing raw materials and foodstuffs insure not only a fixed supply for Belgian industry and consumption but also a share in the profits from such purchases.'

"Belgium points the way to procure these outlets, and Attaché Cross transmits a document which the *New York Herald* points out, says to American toilers, savers and bankers, 'Go thou to the ant: consider her ways.'"

Belgium's success in other parts of the world is repeated here in China, where in the tenders for cars and locomotives opened on June 30th, at Peking, Belgian manufacturers underbid and obtained all the orders with the exception of five locomotives which went to the American Locomotive Company. The Societe Belge pour l'Exportation Industrielle, obtained for their principles the order for thirty Prairie type locomotives, and six English type locomotives for the Shanghai-Hangchow-Ningpo Railway, while Messrs. Fearon, Daniel & Company acting for the Cie. Centrale de Construction a Haine-St. Pierre, secured the orders for the 240 steel cars.

Belgians have also submitted the lowest tender for the Yellow River Bridge, or $10,881,297, and received the prize of $80,000 for the second best design, the prize of $25,000 for the third best design going to the French firm of Etablissement Brossard and Mopin, of Tientsin.

* * *

Japan and the Philippines

THE investigation of an American correspondent, Mr. Charles Edward Russell, into Far Eastern affairs, brings into bold relief Japan's real attitude towards the future of the Philippines, and if Mr. Manuel Quezon received the same impressions when he passed through Japan, it should go a long ways towards dispelling a bogey that has been frequently conjured up about Japan rushing into the islands immediately upon the withdrawal of the United States. All of the leading Japanese statesmen interviewed by Mr. Russell disclaim any desire for the islands. The denial may not be conclusive, and strategical conditions might at some future date arise that would compel Japan to adopt other views, but there can be no doubt that they faithfully and impressively reflect the views of the most responsible Japanese element.

Baron Matsui (declared): "If there were nothing else, the Philippines do not lie in the direction of Japan's development. Our experiences in Formosa have proved it. We are not a people for the tropics." Japanese failure in Formasa is, indeed, well known.

The venerable Marquis Okuma recognizes that the islands could be obtained only by force, and says that, with the lesson of imperial Germany in mind, Japan does not care to attempt any such seizure.

Others say that, even if the United States were not to be reckoned with, Japan could master the Philippines only after a long and bitter struggle with an intensely hostile population, and that Japan has no taste for any such struggle.

The most convincing statement is that of Viscount Kaneko, a graduate of Harvard. He reminds Americans that "if Japan wanted the Philippines, she could have had them long ago, cheaply and easily." In 1897, just before the Spanish-American war, Spain, weary of her long struggle with the natives, asked Japan to take them off her hands for $3,000,000. The Japanese government investigated, concluded that the islands were of no use to it, and declined the offer. "They are the same islands today," says Kaneko, "and this is the same Japan."

The evidence seems to grow stronger each day that Japan is under-going a radical change of heart, and even with the spectre of a rapidly increasing population ever before her, she is not so much concerned about immediate outlets as she is in gaining raw materials for her industries and markets for her products. Japan's problem is one of fighting for her existence, and if denied an outlet, she must struggle to obtain economic independence.

* * *

The Yellow River Bridge

A BELGIAN firm will rebuild the Yellow River Bridge, as the result of an award of the special committee of foreign experts called by the Chinese government to examine into the tenders that were formally opened at Peking on June 30th. Belgium again walks away with a great prize in competition with the rest of the industrial world. Twenty-two tenders were submitted—5 Chinese: 4 American: 3 French: 2 British: 2 Japanese: 1 Austrian: 1 Belgian: 1 German: 1 Anglo-American and 1 Franco-American. The contract goes to a combination of Belgian firms in which figure the Société d'Etudes et de Construction, the Société Belge de Chemins de Fer en Chine and the Compagnie Générale de Chemins de Fer et de Tramways en Chine, all having their head offices in Belgium, or a combination of construction companies who have great experience in Chinese engineering work, and know almost to a cent actual cost items and methods of conducting big work. They get the contract for $10,500,000. Aside from the natural patriotic impulse which must have actuated the Belgians to make every sacrifice and effort to hold their prestige in a work which they created, their success (all other things being equal), must be attributed to their familiarity with the ground and ability to meet and overcome obstacles that compels another contractor lacking their experience to make wider allowances for contingencies. On the other hand, the question of exchange gives the Belgians a distinct advantage over other competitors, especially British and Americans. At the present rate of exchange, this advantage over Americans is estimated at about forty per cent., an impossible handicap in such a competition. The same conditions gives the British manufacturer an advantage of at least twenty-five per cent. over the American, a lead that can be pulled down only by a drastic cut in the costs of production, a slash in wages, which the unionized American worker will oppose to the limit.

A novel feature of the bidding was the entrance of two Japanese concerns into the Chinese engineering field, and we find Mr. Sugahara, a civil engineer and contractor of Tokyo, tendering on Project 1 at a price of $14,972,229 and the East Asia Industrial Company, the strongest Sino-Japanese combination, entering a bid on the same project of $9,736,333, which by comparison with the others indicates close attention to details.

Another feature was the exceedingly low tender of the great British firm of bridge-builders, The Cleveland Bridge and Engineering Company, Limited, whose figure was a little over $5,000,000, or less than one-half the amount of their successful Belgian competitor. In view of the world-wide reputation and recognized ability of this representative British concern, it would seem obvious that they were not fully familiar with conditions.

The main consideration of the experts in determining the award was the design of the structure itself. Something more acceptable than the old screw pile foundation which has failed in practical application in such a shifting river bed as is found in the Hoangho. In awarding the contract, it is said that the committee were unanimous in their decision that none of the forty odd designs submitted filled the requirements and in awarding the prize and contract it was really a question of selecting the least objectionable design. Information from Peking says there is a tendency on the part of the committee to reject all the designs, and devise a new one that meets with their approval and give the contract for its erection to the successful Belgian bidder. The prize of $80,000 for the second-best design was also awarded to a Belgian concern, the Compagnie Générale d'Extrême Orient, while the prize of $25,000 for the third-best design went to the French firm of Brossard & Mopin, of Tientsin. A fourth prize of $15,000 should also have gone to this concern, but under the terms of the competition, no competitor could obtain more than one prize. Americans will be interested in knowing that Messrs. Brossard & Mopin acted for the United States Steel Corporation. The following is the official list of tenderers and prices:—

1.—JOHN R. FREEMAN, Consulting Engineer, Providence, Rhode Island. (Tender incomplete. Rejected.)

2.—M. SUGAHARA, Civil Engineer and Contractor (Tokyo).
Projet I $14,972,229.000.

3.—W. DEYDIER, Ingénieur A & M. à Ire St Gervais (Seine).
Projet I $8,462,000,00.
Variante $9,250,000,00.

4.—UNION D'ENTREPRISES INDUSTRIELLES PARIS (R. Th Waagner-L. & Y. Biro et Kurez à Vienne).
Projet I $9,331,268.55.

5.—SOCIETA NAZIONALE DELLE OFFICINE DI SAVIGLIANO (Turin) represented par Compagnie Italienne d'Extrême-Orient (Tientsin). Projet I $8,310,249.31.

6.—M. SIDNEY Y. POWELL, Consulting Engineer, Shanghai.
Projet I $8,709,454.50.
Projet II $9,952,648.00.

7.—SOCIETE d'ETUDE ET DE CONSTRUCTION.—Société Belge de Chemins de fer en Chine. Compagnie Générale de Chemins de fer et de Tramways en Chine, Bruxelles.
Projet A $14,902,844.82.
Projet B $10,881,297.10.

8.—THE EAST ASIA CO. (Dairen)
Projet I $9,736,333.80.

9.—CLEVELAND BRIDGE AND ENGINEERING COMPANY, LTD.
Projet I $5,165,232.79.

10.—WILLIAM FORBES & CO. for Arthur McMullen Co. and Minneapolis Steel and Machinery Co.
Projet I $12,457,137.11.
Projet IA $13,369,720.00.
Projet IB $12,818,074.55.

11.—HUGO LIU, PEKING, for Lehmann & Co. of Dusseldorf.
Projet I $2,601,427.19 for supplying the steel work only.

12.—ETABLISSEMENT DAYDE ET SCHNEIDER ET CIE PARIS.
Projet A $10,038,665.18.
Projet B $10,493,644.88.
Projet C $10,690,344.25.
Projet D $11,142,187.62.
Projet E $10,807,182.22.

13.—YU FOONG INDUSTRIAL DEVELOPMENT CO., LTD. of Peking
Projet A $8,927,083.44.
Variante $8,198,693.44.
Variante $8,691,983.44.
Projet B $10,149,245.99.
Variante $9,230,995.99.
do. $9,742,555.99.
Projet C $10,428,846.64.
Variante $9,413,726.64.
do. $9,962,786.64.
Projet D $8,740,460.00.
Variante $7,579,970.00.
do. $8,336,250.00.

14.—LAM, GLINES & CO. INC., Gen. Contractors(S'hai & N.Y.)
Projet I $9,804,187.20.

15.—ETABLISSEMENT BROSSARD AND MOPIN (Tientsin).
Projet I $10,846,682.60.
Variante $10,344,755.98.
Projet II $10,380,472.57.
Variante. $10,111,102.80.
Projet III $9,700,499.18.
Variante, $9,504,502.31.

16.—CHUNG HSI ENGINEERING OFFICE, Shanghai.
Projet I. $23,018,347.93.

17.—CARLOWITZ & CO., Shanghai. Fried Krupp Aktiengesellschaft-Friederich Hutte of Rhunhausen (Niederrhien) and Grun and Bilfinger of Mannheim.
Projet I $9,481,944.00.
Variante $8,490,914.00.
Projet II $8,053,400.00.
Variante $7,451,180.00.
Projet III $10,786,895.00.
Variante $9,440,525.00.

18.—THE KAI CHENG ENGINEERING CO., Peking.
Projet I $14,000,000.00.

19.—COMPAGNIE GENERALE D'EXTREME-ORIENT à Paris.
Projet A $9,299,184.31.
Projet B $10,490,981.97.

American Engineering Advertising

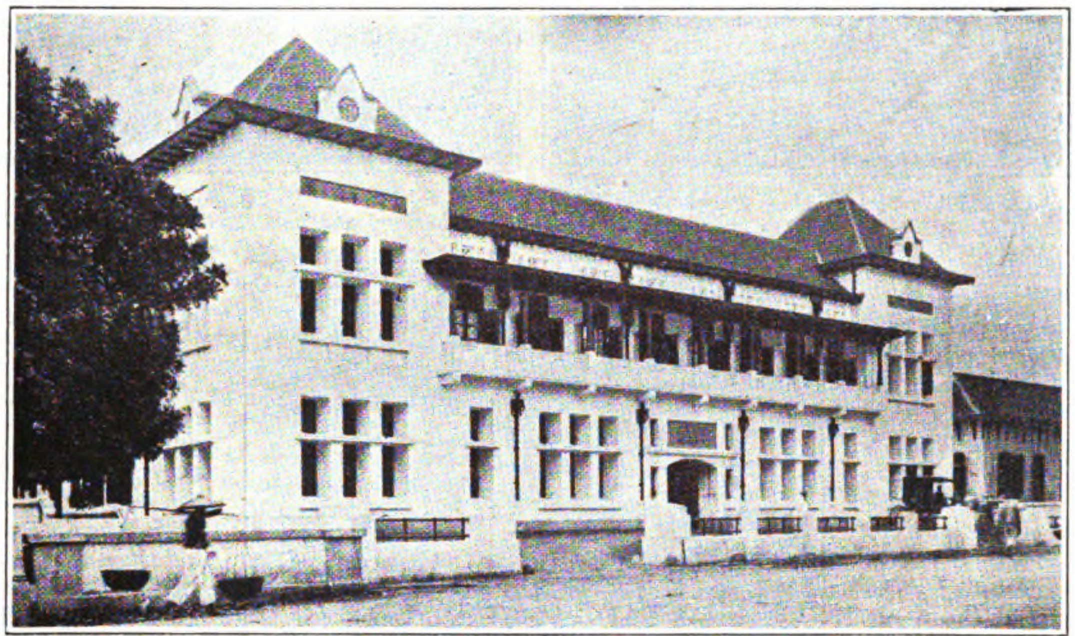
One of the most gratifying results of the post-bellum trade campaign, is the awakening of American engineering manufacturers to the necessity of advertising in foreign technical publications, and engaging experts to supervise their expenditures. In nearly every instance where supervision over their foreign advertising has been entrusted to experts, the returns have been commensurate with the outlay. Too often, however, the manufacturer is guided by the advice of export firms whose choice of mediums is influenced by national, political or sentimental reasons. The report of the American commercial attaché at Peking on crooked advertising practices is a striking illustration of the abuses which arise when expert advice is neglected.

One of the most interesting papers read before the last foreign trade convention was prepared by Mr. A. B. Cole, director of publicity for the Westinghouse Electrical International Corporation, who supports what we have had to say on many occasions. Limitations of space alone prevent us from reproducing this most interesting document in full. He says, amongst other things:

"Many concerns have treated their foreign advertising as a side issue, and carry it as a heavy liability, owing to the lack of proper co-ordinated sales and advertising effort behind a set campaign or advertising program. A certain investment in advertising can be made to produce returns that will parallel, if not exceed, any other investment of equal amount. It can be made to—Add to sales directly add to sales indirectly, create good will for manufacturer and commodity, change living conditions, analyze markets, discover demands for products when none appear to exist, open channels of distribution, and successfully counteract resistances both active and passive."

Industries in the N. E. I.

IN general, Dutch East Indian industry is still in the primary stage of its development. Only a few agricultural industries (cane sugar, rubber, tea, quinine, copra products — concerning which there is considerable data in the archives of the Dutch Government—the oil industry, the tin industry on the Islands of Banka and Billiton and perhaps, also, a few less extensive industries have assumed such proportions as to be of importance to the world household.



Department of Agriculture, Industry and Commerce at Buitenzorg

The disturbance caused by the world war in international business, however, caused the industry of more local significance to gain in importance, and many new industries were established even though at first on a small scale, as a result of this condition.

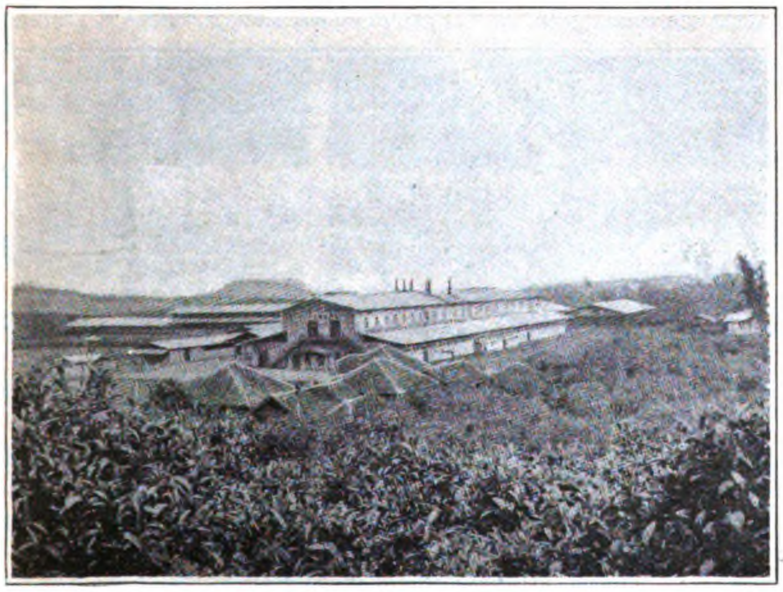
The continually increasing wages in the great industrial countries, in comparison with which wages in Java have become very low, even when the much smaller labor prestation of the Javanese laborer as compared with that of the European or American is taken into consideration, as well as the want of shipping space and the high prices of shipping freights, which have created an effort to have the raw materials produced in the Dutch East-Indies improved and manufactured there, and not in Europe or somewhere else, have considerably improved general conditions for a further development of this industry.

The desirability, also, of assuring to the Dutch East-Indies at least a minimum of economical independence, as demonstrated by the limited international commercial traffic of the last few years, and the necessity of looking about for new means of income for the population of Java, whose rapid increase make it impossible to increase proportionally the chief means of existence, which is agriculture, have again directed the attention of the government as well as of private enterprisers to the industrial development of the Dutch East-Indies.

In order to promote this as much as possible, among other things by close co-operation between the government and private initiative, the commission for the development of industry was created in 1915, which commission consists of high officials, besides men prominent in the financial and industrial field. A delegate member of the commission has charge of the daily course of affairs and keeps in touch with private enterprises.

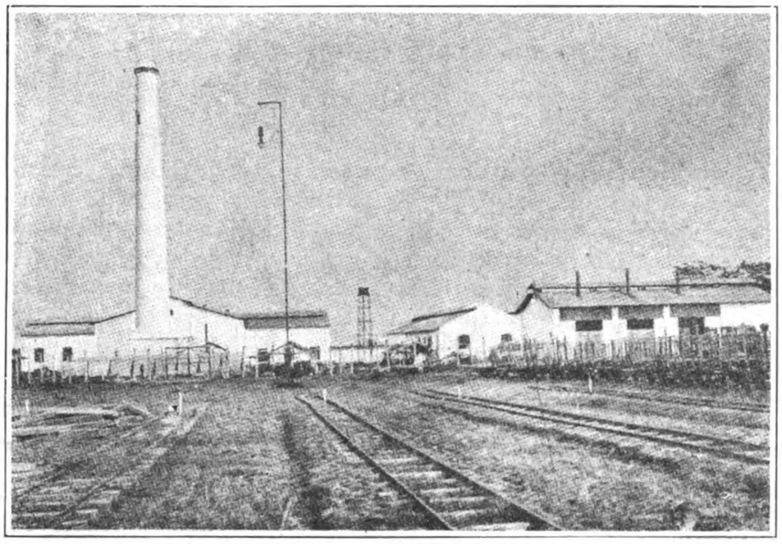
For the promotion of this purpose, also, a separate division of industry was established in 1918, in the department of agriculture, Industry and Commerce, whose task it is to give to private enterprisers as complete information as possible along technical as well as economical lines.

To this division belong various technically trained assistants. It gives, on request, information regarding the source of raw materials, working methods to be pursued, market and labor conditions, etc. It has at its disposal laboratories and workshops, which will soon be considerably increased, where researches are conducted, making it possible for the division to put its advice on an experimental

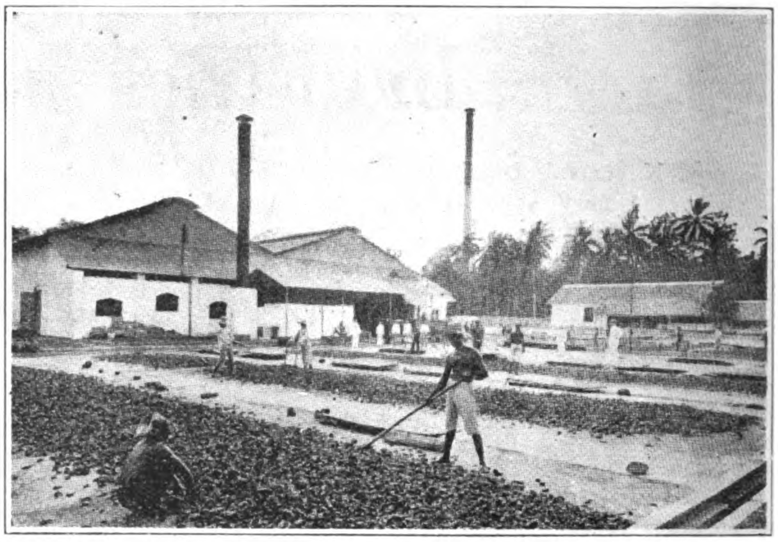


A Tea Factory in Java

A Candle Factory



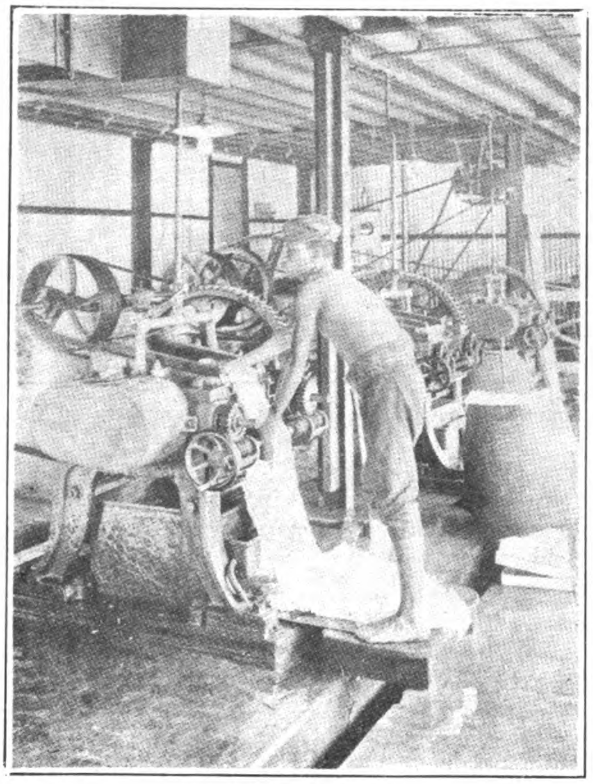
Agave Fibre Factory



Copra Drying Central

basis and at the same time to take into account the conditions regarding raw materials, temperature, labor, etc., all of which vary in the tropics. An experimental station for the ceramic industry started its operations.

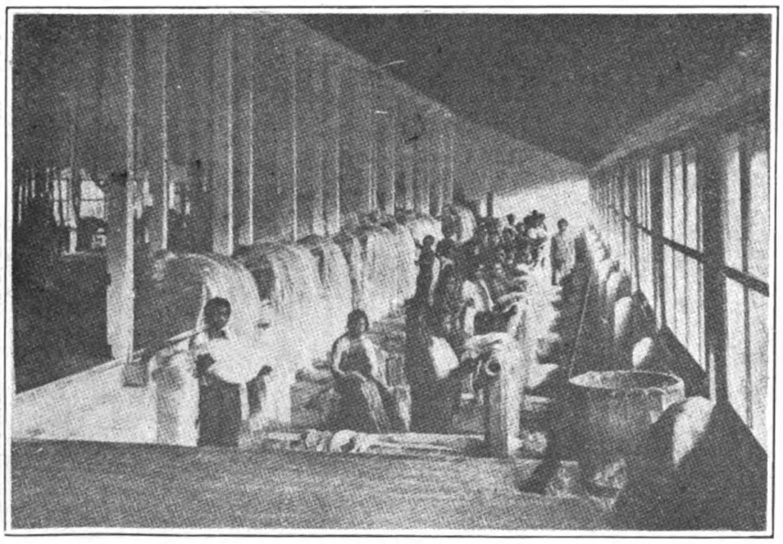
Besides the giving of advice it is the task of the division of industry to take the initiative in introducing new branches of industry, either with or without co-operation from technical officials of other departments. The building of factories for the most important chemical semi-manufactures is now in preparation. Furthermore, the activity of the government extends to the proffering of manufactory premiums and to financial participation in new industrial enterprises, if necessary. From the side of private individuals, interest in the industrializing of the Dutch East-Indies has expressed itself, among other ways, in the founding of the union "The Dutch East Indian Industrial Syndicate," whose purpose it is by general action to look after the interests of the Dutch East Indian industries. The "Dutch East-Indies Annual Fair" association, founded in 1918, also aim to promote Indian industry by the holding of yearly fairs. In May, 1920, the first Dutch East-Indies annual fair will be opened at Bandoeng, in a permanent building especially erected for that purpose.



A Rubber Factory

Besides the factory industry, established on a western basis, the domestic industry of the native population is also a part of the government's care. To raise this industry gradually to the height necessary for a healthy economical development of the colony is the task of the division of industry. The organization of an "outside service" adapted for this work is in preparation.

A few brief facts regarding some special branches of industrymay still be given. All the raw materials necessary for the machine industry must still be imported from foreign countries, since the steel furnace industry in South Sumatra is not yet able to produce, owing to difficulties encountered in its installation. Manufacture is limited to small machines and repairs of



Cleaning Sisal Hemp

Separating Capoc Fibre from the Seeds, Bull and Pil

already existing installations. The industry is suffering very much for lack of good, skilled labor. Efforts are being made to provide for this want by establishing industrial schools for natives, but the scope of this instruction, which is still in its first stages, is too slight to show any favorable influence on the industry.

The machine manufacturers in Sourabaya have formed the "Union of Machine Manufacturers in the Dutch East-Indies," by which body efforts are being made to improve the conditions under which the industry is being carried on in the Dutch East-Indies. All machine factories produce also what is known as construction work, such as factory buildings, sheds, iron roofs, etc. Iron foundry is increasing in importance. Shipbuilding in the Dutch East-Indies, so far as iron ships are concerned, is confined to the navy yard at Sourabaya. Here also is felt the importance of skilled work men, especially with regard to the production of water-tight rivet work. The building of wooden ships is suffering from the ever increasing prices of wood.

Great strides have been made during the past few years in the manufacture of edible oils. Together with this has gone the development of oil-refining, to which the great companies have given their special attention. This manufacturing is increasing to such an extent that it is feared the copra production of India will soon prove insufficient. It is expected, however, that native oil-making, by which at present much copra is withheld from the factories, will prove too uneconomical in the long run on account of the very high coconut prices, and a transferance of the coconut produce to the wholesale industry is therefore awaited. However, copra-production must also be increased by the cultivation of coconuts, if the world demand for copra and copra-products is to be satisfied.

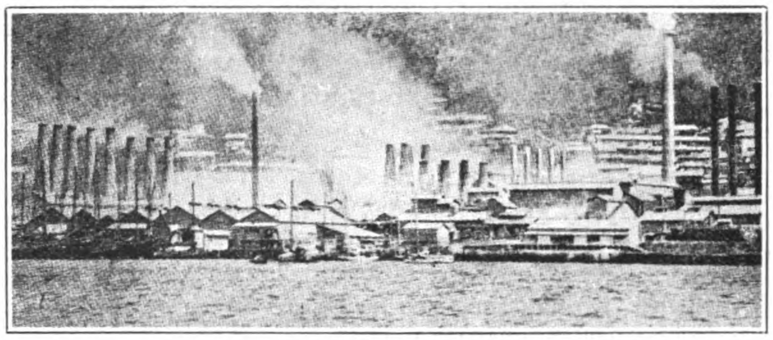
In connection with the manufacturing of edible oils, soap-making is carried on, and already many enterprisers have specialized in this branch, which in the near future will also be run on a more scientific scale. Fire-proof normal-stones and stones of special shape are made in a factory in Rembang. The city of Bandoeng has now its own brick and tile works. The number of these factories, which are under European management, is steadily increasing. Cardboard is made in a factory in Java. There is also a factory where tincans are made, a paint factory, a factory for broom fibre, etc. Spirits and arak are made from the molasses of the sugar factories. At Bandoeng there is a factory for preserved food, which, among others, purveys to the army. In Semarang beer of a good quality is brewed. Tanning-manufacturing is carried on, but will never attain any great development, because superior tanbarks of some difference cannot be obtained. Leather tanning will increase in importance in the future by adapting scientific management. Rope is machine-spun in South Sumatra; hand-spinning is found in some places in Java. Building materials, such as cement, cement-tiles, mortar, etc., are already made, while factories for artificial marble and pumice cement are being built. Limekilns are increasing in number. A glass factory is being considered.

Sugar factories, tea factories, rice mills, cassava-flour factories, etc., are found in great numbers. Cacoa is manufactured into chocolate in various small factories. The manufacturing of essential oils, alcaloids, etc., is steadily increasing in importance. Cigars and cigarettes are now expertly made in almost all qualities. Mineral water, lemonade and ice factories provide for the need created by the warm climate. A macaroni-factory has been extended. Besides many small fireworks factories there are the pyrotechnical workshops and the Romanit factory.

Among chemical products the chief ones manufactured in the Dutch East-Indies are oxygen, carbonic acid, iodium, sodium bisulphate, sulphur, sulphur carbon, carbide, etc. Opium is manufactured in the government factory at Batavia. The woodwork industry has been enriched by several triplex-chest factories. The number of gas factories is increasing. A real textile industry exists only in the prison at Cheribon. Print shops, book-binderies and factories of office-supplies appear capable of continuous extension. In Bandoeng and in Sourabaya are factories for rubber articles, for which a good future is promised.

Japanese Cement Industry

THE remarkable development of the cement industry in Japan is the subject of an interesting article in a recent number of the *Yakugyo Shuho*, Tokio. It is pointed out that although the manufacture of cement in Japan was commenced in 1880, it was not until 1916 that an export trade was started; but from that date the productive capacity advanced at a rapid rate, until



Asano Cement Works at Moji

in 1919 it stood at 6½ million barrels, as against only 1¾ million barrels in 1908. The enervating dullness which sapped the energy of Japanese industry generally on the termination of the war had apparently little effect on the cement industry. This singular immunity from so comprehensive a depression was preserved by the active promotion of the hydro-electric schemes and of general building and engineering works. The prosperity of the industry naturally resulted in the establishment of a number of new concerns. In 1914 the number of cement manufacturing companies was twelve, with a total investment of 32 million yen, but at the end of 1919 the number increased to more than twenty, with a total investment of over 44½ million yen. The frantic establishment of innumerable businesses, always the concomitant of boom, was only to be followed by a closing down of these petty concerns on the first signs of industrial depression. As to the future, the article strikes anything but an optimistic note. The industry at last appears to be suffering from the prevailing depression. The war prosperity was evolved rather out of the stoppage of imports from Europe and America than from any inherent qualities which Japanese cement might have possessed, so that it is not surprising that the export of cement from Japan should decline with the termination of hostilities and the restoration of industrial capabilities in Europe and America. For the present, the export of cement has not suffered to any appreciable extent as compared with 1919, but that Japan will be able to retain the foreign market she had acquired during the war must be regarded as doubtful.

Road Reparation at Tengyueh

REPORTS the commissioner of customs at Tengyueh that the work of road reparation included the reconstruction of the Siaohoti (小河底) bridge that spans a mountain torrent just before its junction with the Tiehshuiho (鉄水河), or Tengyueh River, at a spot some seven miles distant from Tengyueh. Starting from this point, the whole of the section up to Tengyueh had been dealt with by the end of August. Thereafter various minor repairs were effected in the section between Siaohoti and Chetao (遮島).

Railway Car and Locomotive Tenders Opened at Peking

The opening of the tenders for the supply of cars and locomotives for Chinese railways, submitted in response to the advertisement of the Chinese Banking Group (who furnished the loan) took place on June 30, at Peking. The tenders were examined by a board of eleven members, five appointed by the Chinese Banking Group and six from the Ministry of Communications. Belgian manufacturers walked away with the most valuable prizes, America came in for five locomotives, while the manufacturers of other nations, Great Britain, France and Germany, failed to receive awards. The Chinese Banking Group behind the Railway Car Loan acting in accordance with the recommendations of the board which examined and awarded the contracts officially announced on July 4th the following information concerning the tenders and the names of those who received them to whom the contracts were awarded :—

Orders	Successful Bidders	Manufacturers
30 Prairie Type Locomotives for Peking-Hankow Railway	Societe Belge pour l'Exportation Industrielle	Forges Usines et Fonderies de Haine-St-Pierre Ateliers Metallurgieues Tubize Societe Franco-Belge a la Croyere, Belgium
6 English Type Locomotives for Shanghai-Hangchow-Ningpo Railway	Societe Belge pour l'Exportation Industrielle	do.
2 Mikado Type Locomotives for Peking-Suiyuan Railway	Mitsui Bussan Kaisha, Ltd.	American Locomotives Company, U. S. A.
3 Pacific Type Locomotives for Peking-Suiyuan Railway	Mitsui Bussan Kaisha, Ltd.	American Locomotives Company, U. S. A.
100 40-Metric Ton All Steel H. S. Open Wagons for Peking-Suiyuan Railway	Fearon, Daniel & Company	Compagnie Centrale de Construction à Haine-St-Pierre
100 40-Metric Ton All Steel Covered Wagons for Railway T. T. P. R.	Fearon, Daniel & Company	do.
40 40-Metric Ton All Steel Covered Wagons for Shanghai-Hangchow-Ningpo Railway	Fearon, Daniel & Company	do.

I.—Thirty Prairie Type Locomotives for Peking-Hankow Railway

Names of Tenderers.	Names of Manufacturers.	Prices as quoted.
1 Fu-Hsing Trading Co.	Hohenzellern Work for Locos., Germany	G. $50,000
2 Arnhold Bro. & Co., Ltd.	Messrs. Beyer Peacock & Co., Ltd., England	£13,647
3 Andersen, Meyer & Co., Ltd.	Baldwin Loco. Works, U. S. A.	U. S. Gold $52,500
4 Andersen, Meyer & Co., Ltd.	Baldwin Loco. Works, U. S. A.	U. S. Gold $51,000
5 Nicholas Tsu Engineering Works	Messrs. Schneider & Co., France	French Francs 18,962,620
6 Shewan, Tomes & Co.	W. G. Armstrong, England	£18,732 for 30 £19,040 for 15 £19,750 for 5
7 Carlowitz & Co., Tientsin	Henschel and Sohn, Cassel, Germany	G. $49,955
8 Han Yung Co., Shanghai	Humbolt, Cologne and Borsig, Germany	G. $51,900
9 Czecho-slovak Central Economic Commission, Shanghai	German Works' name to be given later	G. $57,000
10 Jardine, Matheson & Co., Ltd.	Lima Loco. Co., U. S. A.	G. $44,700 Total 1,341,000
11 Wah Chang Trading Corp., S'hai	Vulcan Iron Works, U.S.A.	G. $47,600 Total 1,428,000
12 Wah Chang Trading Corporation	Lima Loco. Co., U. S. A.	G. $47,000 Total 1,410.000
13 Charles Ley, Peking	Haine St. Pierre Ateliers Metallurgiques or Societe Franco-Belge	Belg. Francs 464,500
14 Jardine, Matheson & Co., Ltd.	The North British Loco. Co., Ltd., Glasgow	£15,667
15 Jardine, Matheson & Co., Ltd.	Lima Loco. Co., U. S. A.	G. $60,248
16 Norway-China Trading Co.	Linke Hofmann-Works, Breslau, Breslau, Germany	G. $49,215
17 Central Trading Co., Ltd.	The Great Union of German Loco. Works, Germany. "The Specific Name" of the manufacture selected out of this Union for the order to be given in a few days	G. $51,895

Names of Tenderers.	Names of Manufacturers.	Prices as quoted.
18 The Robert Dollar Co., Peking	The Vulcan Iron Works, U. S. A.	G. $50,365
19 Representations Industrielles Belges, Peking	Waiting for Cable advice for Belgium	Belg. Francs 475,800
20 Fearon, Daniel Co., Inc., Shanghai	Engine Societe Energie Charleroi, Belgium Tender Hame - Saint - Pierre, Belgium	Engine Belgian Francs 409,200 Tender Belg. Francs 56,055
21 Banque Sino-Francaise, Tientsin	Schneider & Co., France	French Francs 18,962,620
22 Representation for British Manufacturers, Ltd.	Forth Banks Loco. Works, England	£13,700
23 Societe Belge pour l'Exportation Industrielle, Peking	Haine St. Pierre Ateliers Metallurgique Societe Franco-Belge, Belgium	Belg. Francs 410,000
24 Societe Belge pour L'exportation Industrielle, Peking	do.	Belg. Francs 452,550
25 The East Asia Industrial Co., Ltd., Tokyo	Kawasaki Dockyard Co., Kei Sha Seizo Kabushiki Kaisha, Japan	Yen 85,000
26 Wah Chang Trading Corporation, Shanghai	Lima Loco. Co., U. S. A.	G. $52,000
27 Mitsui BussanKaisha, Ltd., Tientsin	American Loco. Co., U. S. A.	G. $44,200
28 Associated Brass and Copper Manufacturers of Great Britain, Ltd., Shanghai	Vulcan Foundry Co., Ltd., England	£13,075 c.i.f. Liverpool

II.—Tenders for Six English Type Locomotives for Shanghai-Hangchow-Ningpo Railway

Names of Tenderers.	Names of Manufacturers.	Prices as quoted.
1 Fu-Hsing Trading Co.	Hohenzollern Works for Loco., Germany	G. 48,000 each $13,500 spare parts per set $61,500 Local Currency and spare part.
2 Arnhold Bros. & Co., Ltd., Peking	Beyer Peacock & Co., Ltd., England	£17,280 each
3 J. Whittall & Co., Ltd., Peking	North British Loco. Co., Ltd., Glasgow	£13,500 each
4 Carlowitz & Co, Tientsin	Henschel and Sohn, Cassel, Germany	Gold $48,700 each
5 Jardine, Matheson & Co., Ltd., Shanghai	North British Loco. Co., Ltd., Glasgow	£14,133 each
6 Charles Ley, Peking	Forges Usines et Fonderies de Haine St. Pierre 3, Manufacturers given. Belgium	467,000 each. Belgian Francs.
7 l'Exportation Industrielle, Peking	(1) Forges Usines et Fonderies de Haine St. Pierre; (2) Ateliers Metallurgiques a Tubize;(3) Societe Franco-Belge de Materiel de Chenim defer à La Croyeres	412,000 each (duty excluded) Belgian Francs 434,660 (duty and famine surtax included)
8 Norway-China Trading Co.	Linke Hofmann Works	G. $47,530 each $13,260 per set of spare parts
9 Czecho-slovak Central Economic Commission, Shanghai	German Makers, no particular Manufacturer given	G. $56,000 each
10 Representations Industrielle Belges, Peking	Belgian Maker	Belg. Francs 478,100 each
11 Han Yang Company, Shanghai	Humbolt Cologne and Borsig of Berlin, Germany	G. $51,000
12 Representation for British Manufacturers, Peking	R. & W. Hawthorn, Leslie Co., England	£11,000 each £4,500 spare parts
13 Central Trading Co., Peking	The Great Union of German Loco. Works. No name given. Germany	U. S. G. $64,735 each
14 Mitsui Bussan Kaisha Ltd., Tientsin	American Loco. Co., U. S. A.	G. $40,530 each $14,000 spare parts $2,200 per set of trading

III.—Tenders for Two Mikado Type Locomotives for Peking-Suiyuan Railway

Names of Tenderers.	Names of Manufacturers.	Prices as quoted.
1 The East Asia Industrial Co., Ltd.	Kawasaki Dockyard Co., Ltd., Kobe	Yen 100,000
2 Carlowitz & Co., Tientsin	Henschel and Sohn, Germany	Gold $59,225
3 Andersen, Meyer & Co.	Baldwin	Gold $52,500
4 Norway-China Trading Co., Tientsin	Linke Hofmann Works, Breslau, Germany	Gold $56,350
5 Han Yung Co., Shanghai	Humbolt Cologne and Borsig of Berlin	Gold $61,500
6 Fu-Hsing Co., Tientsin	Hohenzollern Works, Germany	Gold $57,000
7 Charles Ley, Peking	Haine - St. - Pierre Ateliers M'clally a Tubize Soc. Franco-Belge, Belgium	Belg. Francs 589,800
8 Czecho-slovakCentral Economic Commission, Shanghai	German Engine Works of best repute	Gold $60,500
9 Jardine, Matheson & Co., Ltd.	Lima Loco. Works	Gold $66,520
10 Hwa Fa Trading Co.	Orenstein and Koppel Berlin	Gold $64,000

Names of Tenderers.	Names of Manufacturers.	Prices as quoted.
11 Societe Belge pour l'Exportation Industrielle	Haine - St. - Pierre Ateliers Metall. at Tubize Soc. Franco-Belge, Belgium	Belg. Francs 548,600
12 Robert Dollar Co.	Vulcan Iron Works or Wilkes-Barre, Pems, U. S. A.	G. $54,550 each
13 Representation of British Mftrs., Ltd.	Forth Banks Loco. Works, Newcastle-upon-Tyne	£17,000 each
14 Central Trading Co., Peking	Great Union of German Loc. Works, Germany	U. S. Gold $60,990
15 Arnhold Brothers & Co., Ltd.	Beyer Peacock & Co., England	£14,904 each
16 Wah Chang Trading Corporation, Shanghai	Lima Loc.	U. S. Gold 68,970 each
17 Wah Chang Trading Corporation	Alternative Mikado by Vulcan Iron Works	U. S. Gold 53,660 each
18 Representation Industrielle Belge	do.	Belg. Francs 603,000
19 Mitsui Bussan Kaisha	American Loc. Works	G. $52,000

IV.—Tenders for Three Pacific Type Locomotives for Peking-Suiyuan Railway

Names of Tenderers.	Names of Manufacturers.	Prices as quoted.
1 Central Trading Co.	Great Union of Engineering Locomotive Works	U. S. Gold $58,636
2 Carlowitz & Co.	Henschel and Sohn, Cassel	Gold $56,400
3 Czecho-slovak Central Economic Commission	German Makers. Name to be given later	G. $65,000
4 Charles Ley	Haine - St. - Pierre Ateliers Metellurgique Societe Franco-Belge	Belg. Francs 584,000
5 Norway-China Trading Co.	Linke - Hofmann Works	G. $53,940
6 Fu Hsing Trading Co.	Hohenzollern Locomotive Works	G. $55,000
7 East Asia Industrial Co.	Kisha Seizo Kabushiki Kaisha, Osaka	Total Yen 282,000 (94,000 each)
8 do.	do	Total Yen 237,000 (79,000 each)
9 Andersen, Meyer & Co.	Baldwin Works	G. $50,900
10 Wah Chang Trading Co.	Lima	G. $60,880
11 do.	Vulcan Iron Works	Gold $52,190
12 Han Yung Co.	Humbolt and Borsig	Gold $58,500
13 Jardine, Matheson & Co., Ltd.	Lima Works	Gold 58,355
14 Representative for British Manufacturers	Hawthorn, Leslie & Co.	£16,500
15 Arnhold Brothers & Co.	Beyer Peacock	£14,310
16 Robert Dollar Co.	Vulcan Iron Works	Gold 53,680,000
17 Societe Belge pour l'Exportation Industrielle	Haine - St. - Pierre Ateliers Metallurgique Soc. Franco-Belge	Belg. Francs 515,000

V.—Tenders for 100 40-Metric Ton All Steel U.S. Open Wagons for Peking-Suiyuan Railway

Names of Tenderers.	Names of Manufacturers	Prices as quoted
1 Yu Foong Industrial Development Co.	Haseluirenfabrik Augsburg Nurnberg	£882 each
2 Shingming Trading Co.	Compagnie Central de Construction at Haine-Saint-Pierre, Belgium	B. F. Frs. 28,905 discounted B. F. 30,443 Francs mounted each
3 Harrisons, King and Irwin	The National Steel Car Corporation	Gold $2,572 each
4 Yangtze Engineering Works	Yangtze Engineering Works	Hankow Tls. 9,200 each
5 Representation Industrielles Belges	Of Belgian manufacture, no makers' name	B. F. 35,600 each
6 Hwa Fa Trading Company	The Dortmond Union and the Orenstein and Koppel A. G. F., Berlin	£88,614 each
7 Arnhold Brothers & Company	Metropolitan Car, Wagon and Finance Co., Belgian Works	B. F. 33,919 each
8 Arnhold Brothers & Company	Lorraine Dietriech, France	F. F. 44,371 each
9 Arnhold Brothers & Company	Metropolitan Car, Wagon and Finance Company Birmingham, England	£12,431 each
10 Reiss & Company	Chickasaw Car Company	Gold $3,132 each
do.	do.	Using Schoen Steel Wheel G. $240, Reduced
11 J. Whittall & Company	National Steel Car Corporation, U. S. A.	Gold $2,550 each
12 Jardine, Matheson & Company	The Metropolitan Carriage, Wagon and Finance Co., Belgian Works	B. F. 36,282 each
13 Jardine, Matheson & Company	Merchants' Despatch Company, N.Y.	Gold $ 3,533 each
14 Robert Dollar Company	American Car and Foundry Company	Gold $3,075 each
15 Fearon, Daniel & Company	Compangne Central de Construction, Haine-Saint-Pierre, Belgium	B. F. 31,325 each

Names of Tenderers.	Names of Manufacturers.	Prices as quoted.
16 Societe Belge Pour l'Exportation Industrielle	Ateliers du Roenix Roenix, Belgium	B. F. 30,530 each B. F. 32,215 each
17 Yu Foong Industrial Development Co.	Union, Dortmond and Orenstien and Koppel, Berlin	£838 each
18 East Asia Industrial Co.	Kawasaki Dockyard Co., Kisha Seizo and Nihon Sharyo Seizo Kaboshiki Kaisha	Y. 6,000
19 General American Car Company	General American Car Company	Gold $3,025 each
20 Fu Chung Corporation	Messrs. Hurst Nelson & Co.	£1,340,000 each
21 Wah Chang Trading Corporation	Magor Car Corporation	Gold $2,891 each
22 Fu-Hsing Trading Co.	I Harkort Duisburg Germany	£ Stel. 625 each
23 Carlowitz & Co.	Firm of Hannoversche, Maschinenbau and Wagon Fabrik, Hannover	7,323 Chinese Dollar each
24 Norway-China Trading Co.	Aktien Gesellschaft fuer Eisen-Industrie en Bruckenbau. Vormals J. C. Harkort Duisburg, Germany	£ Stel. 612 each
25 Charles Ley	Le Ateliers du Roenix, Belgium	B. F. 34,500 each
26 Dowler, Forbes & Co.	Kilbourne and Jacobs Manufacturing Company, Columbus, Ohio, U.S.A.	Gold $3,150 each
27 Andersen, Meyer & Co.	Middletown Car Co., U.S.A.	Gold $289,000 total
28 Representation for British Manufacturers Limited	Cravens Railway Carriage and Wagon Co of Sheffield, England	£10,16,000 each
29 Williams, Forbes & Co.	Pressed Steel Car Company, U. S. A.	Gold $3,095 each
30 Cie - Gen - d' Extreme Orient	do.	Frs. 60,000 each
31 Mitsui Bussan Kaisha	Pennsylvania Car Co.	Gold $2,750
32 do.	American Car and Foundry Co.	Gold $2,826,000
33 Associated Brass and Copper Manufacturers	Birmingham Ry Carriage and Wagon Co.	£1,085
34 Hua Hsing Trading Co.	Midland Car Co. Standard Car and Equipment Co.	Gold $3,605.24
35 do.	do.	Gold $2,995

VI.—Tenders for 100 40-Metric Ton All Steel Covered Wagons for Tientsin-Pukow Railway

Names of Tenderers.	Names of Manufacturers.	Prices as quoted.
1 Harrisons, King and Irwin, Ltd.	The National Steel Car Corporation. Sandberg Works, New Jersey U.S.A. also Hamilton Ontario, Canada	Gold $2,908 each
2 Norsk Chinesisk Handels—A S Filial, Tientsin	Aktien Gesellschaft fuer Eisen-Industrie en Bruckenbau. Vormals J. C. Harkort Duisburg, Germany	£673 each
3 Arnhold Brothers & Co., Ltd.	The Lorraine Dietrich, Ltd., France	French Frs. 49,559 each
4 Arnhold Brothers & Co., Ltd.	The Metropolitan Car, Wagon and Finance Co., Ltd., Birmingham, England	£1,410 each
5 Arnhold Brothers & Co., Ltd.	The Metropolitan Car, Wagon and Finance Co., Ltd., Belgium	Belgium Frs. 39,108 each
6 Whitall & Co., Ltd.	The National Steel Car Corporation, U.S.A.	G. $2,620 each, C. I. F. Pukow
7 Jardine, Matheson & Co., Ltd.	Metropolitan, Carriage, Wagon and Finance Co., Ltd., Belgian Works	Belgian Frs. 44,415 each, C. I. F. Pukow, including import duty and dues
8 Jardine, Matheson & Co., Ltd.	Merchants' Despatch Co., A Subsidiary of the New York Central Railway Co. ,New York	Gold $3,842 each, C. I. F. Pukow, including import duty and dues
9 Arnhold Brothers & Co., Ltd.	Lorraine Dietrich, Ltd., France	French Frs. 49,559 each
10 Carlowitz & Co.	Hannoversche Maschinenbau and Wagon Fabrik, Hannover	Chinese Dollars 8,937 each
11 The Robert Dollar Co.	The American Car and Foundry Co., U.S.A.	G. $3,323 each C. I. F. Pukow
12 The Robert Dollar Co.	The American Car and Foundry Co., U.S.A.	G. $3,410 each C. I. F. Hsinho
13 Societe Belge pour l'Exportation Industrielle	Ateliers de Roenix a Roenix, Belgium	Belgian Frs. 34,645 each C. I. F. Pukow,Custom's duty for account of the Tientsin - Pukow Railway
14 Reiss & Company	Chickasaw Car Company	G. $3,259 each G. $3,019 each if steel solid wheel be used.
15 Fu Hsing Trading Co.	T. Harkort Duisburg, Germany	£685 each not including duty or dues in China

Names of Tenderers.	Names of Manufacturers	Prices as quoted
16 Dowler, Forbes & Co. (China) Ltd.	The Kilbourne and Jacobs Manufacturing Co., Columbus, Ohio	G. $3,470 each including duties delivering at wharf special by the Railway later. If no duty G. $250 may be deducted making the price at G. $3,220 each
17 Andersen, Meyer & Co., Ltd.	Middletown Car Co.	G. $3,158 each
18 Leon Hoyaux Representations Industrielles Belges	Belgian Manufacture. Name not stated	Belgian Frs. 40,300 C. I. F. Pukow
19 The Shingming Trading Co., China	Compagnie Central de Construction at Haine-St.-Pierre, Belgium	Belgium Frs. 30 955 each. If frame may be shipped dismounted Belgium Frs. 32,493 each if frames are shipped mounted
20 Associated Brass and Copper Manufactures of Great Britain	Birmingham Railway Carriage and Wagon Co., Ltd. Birmingham, England	£1,160 each C. I. F. Shanghai Hankow and Hsinho
21 Fu Chung Corporation	Hurst Nelson & Co. Motherwell, Scotland	£1,470 each
22 The Yangtsze Engineering Works, Ltd.	The Yangtsze Engineering Works Ltd.	Hankow £9,800 each
23 Charles Ley	Les Ateliers du Roenix, Roenix, Belgium	Belg. Frances 38,150 per piece delivered C. I. F. at Pukow
24 Fearon, Daniel & Co.	Compagnie Central de Constructions Haine-Saint-Pierre, Belgium	Belgium Francs 33,965 C.F.E. duty paid
25 Wah Chang Trading Corporation	Magor Car Corporation, Passaic H. T., U. S. A.	Gold $3,230
26 Shewan, Tomes & Co.	Metropolitan Carriage Wagon and Finance Co., Ltd. at their works at Birmingham or Wednesbury or Manchester, England	£1,383 each for 100 wagons; £1,416 each for 50 wagons; £1,450 each for 25 wagons. Delivered at Pukow
27 Williams Forbes & Co.	Pressed Steel Car Co.	Gold $3,479
28 Mitsui Bussan Kaisha, Ltd.	Pennsylvania Car Co	Gold $2,833
29 Mitsui Bussan Kaisha, Ltd.	American Car and Foundry Co.	Gold $3,313 Gold $3,313
30 Hua Shen Trading Co.	Midland Car Co. or Standard Car and Equipment Co. or Mount Vernon Car Co.	Gold $3,984.76 each
31 Hwa Fa Trading Co.	The Dortmund Union and the Orenstein and Koppel A. G. of Berlin	£1,044 5
32 Yu Foong Industrial Development Company, Ltd.	Machinenfabrik-Augsburg - Nurnburg	£1,044 6
33 Yu Foong Industrial Development Company Ltd.	Union, Dortmund and Orenstein and Koppel, Berlin	

VII.—Tenders for Fourteen 40-Metric Ton All Steel Covered Wagons for Shanghai-Hangchow-Ningpo Railway

Names of Tenderers.	Names of Manufacturers.	Prices as quoted
1 Representation for British Manufactureres	Craven Ry Carriage and Wagon Company Ltd. Sheffield	£1,205 for 40 cars only; if 140 cars price for each cars £1,192
2 Representation Industrielle Belge	Belgian Manufacturers	Belgian Fcs. 40,300
3 Norway China Trading Company Ltd.	Aktien - Gesellschaft Eisen - Industrie and Bruecchen ban Duisbury	£673
4 J. Whittall & Co.	The National Steel Car Corporation U. S. A.	G. $2,785
5 Fu-Hsing Trading Co.	T. Harkort. Duisbury, Germany	£685
6 Societe Belge pour l'Exportation Industrielle	Ateliers de Roenix a Rollenix Belgium	Belgian francs 33,645
7 William Forbes & Co.	Pressed Steel Car Co., Pittsburg	Gold $3,745 for 40 Cars; if 140 Cars Gold $3,479
8 Fearon, Daniel & Co.	Haine - St. - Pierre, Belgium	Belgian Francs 33,965
9 Wah Chang Trading Co.	Magor Car Corporation of Hamilton	Gold $3,230
10 Dowler, Forbes & Co.	Kilbourne and Jacobs, U.S.A.	Gold $3,470
11 Robert Dollar	American Car and Foundry, U.S.A.	Gold $3,255
12 Shingming Trading Co.	Haine - St. - Pierre, Belgium	Belgium Francs 30,955 frame dismounted
13 Associated Brass and Copper Manufactures of Great Britain	Birmingham Ry Ca riage and Wagon Co., England	£1,160
14 Yangtsze Engineering Works, Hankow	do.	Hankow Taels 9,800
15 Arnhold Bros. & Co.	Metropolitan Car Wagon and Finance Co., Belgium	B. F. 39,108
	Metropolitan Car Wagon and Finance Co., England	£1,410

	Names of Tenderers.	Names of Manufacturers	Prices as quoted
16	Yu Chung Corporation	Hurst Nelson and Co.	£1,470
17	Harrisons, King & Irwin	National and Car Corporation, U.S.A.	G. $3,089
18	General Am. Car Co.	General American Car Co., Chicago, Md., U.S.A.	U.S.G. $3,300 per car if no duty or dues reduced to $3,085
19	Carlowitz & Co., Peking	Hannoversche Maschinenbau waggon Fabrik, Hanover, Germany	Chinese dollar $8,575 per piece provided $ 1=3 mks. $7.80 =£1
20	Andersen, Meyer & Co., Peking	Middletown Co., Penn., U.S.A.	U.S.G. 126,350
21	Shewan, Tomes & Company, Agent of Samuel & Co.	Metropolitan Carriage Wagon and Finance Company England	£1,411 per wagon
22	Charles Ley	Les Ateliers du Roenix, Le Roenix, Belgium	Belgium Francs 38,150
23	Jardine, Matheson & Company Ltd., Shanghai	Metropolitan Carriage Wagon and Finance Co. Ltd. Works, England	£1,510
24	Reiss & Company	Chickesaw Car Co.	U.S. $3,422
25	Jardine, Matheson & Co., Ltd., Shanghai	Metropolitan Finance Carriage, Company Ltd, Belgian Works	Belgian Francs 48,397
26	Jardine, Matheson & Co., Ltd., Shanghai	Merchants Despatch Co.	G. $4,183
27	Mitsui & Co.	Pennsylvania Car Co.	G. $2,833
		American Car and Foundry	G. $3,319
28	Yu Foong Industrial Development Co.	Mashinen fabrik Augsburg Nurnberg.	£971
29	Hua Shen Trading Co.	No makers' name	G. $3,984
30	Hua Sheng Trading Co.	No makers' name	G. $3,386 each

The Tien Pao Coal Colliery

SO little information on Chinese-owned mines is available that when details are obtained they are of particular value. It is not likely that many have heard of the Tien Pao Coal Colliery situated as Hsiang-tan-hsien, Honan. This is a spot about 160 *li* away from Changsha, half a *li* from the Hsiang River and two *li* from the projected Canton-Hankow Railway. To reach it by water 90 *li* must be traversed from Chuchow, 150 *li* from Hsiang-tan city and 240 *li* from Changsha. When discontented soldiery and other pirates are not in evidence, a regular steam launch service plies between Changsha and Hengchow which lands passengers at a place called Chong-shu-ma-tou where an inn of sorts is, the property of the mining administration, is ready to render such hospitality as is possible. In the winter when the depth of the waterways do not permit of steam launch penetration a visitor from Changsha may take the Changsha-Chuchow railway to Chuchow and from this last mentioned place he will be able to reach the colliery by shallow drafted chinese junk in about two days time. All steam launches carry cargo during the spring, summer and autumn: and in the winter the shallow drafted junks each carry about ten tons per trip. The cost of transporting coal from the colliery to these boats is Mex. $0.27 per ton.

The colliery was first registered with the ministry of agriculture in May 1917 by Mr. Li Kuan-li who obtained permission to operate on land covering an area of 342 Chinese acres. Later this gentleman was given permission to extend the colliery's operations over an area of 2264 *mow*, making in all an area of a little more than five square miles.

It is stated that the deposit of coal formed on the banks of the Hsiang-kiang river during the permo-carboniferous period. The presence of carboniferous limestone at the Tien Pao mine is stated to prove this. The basin of coal on which the Tien Pao colliery is situated is 30 Chinese feet thick, running northward 110° E. and inclining at 45°. The length of the basin has been proved to be 9 *li* and its depth as estimated by the natives is 1,500 Chinese feet. With these figures to work on it is estimated that there are about 28,000,000 tons of coal in the deposit.

There are four shafts in all from which coal is hauled to the surface. The first shaft is worked with modern appliances from abroad, while Chinese methods form the means of excavation work in the other shafts. There are eight seams of coal through which the first shaft passes in its depth of 242 feet but only three of these have proved worth operating on. The irregularity in the distribution of coal often causes disappointment, a three-foot seam often dwindling to a one foot thickness which is hardly profitable to work upon. In the second shaft there are three seams two of which have been cut into. Here the seams range from two to three feet in thickness. There is only one seam in the fourth shaft but as yet this has not been touched.

The coal that is mined is bituminous, hard, black, does not stain and is suitable for use in refineries. Its chemical composition is as follows:

Water 1.4, carbon 72.3, volatile substance 18.5, ash 7.6 and sulphur 1.62.

As regards labor, men who work 8 hours a day can be obtained, with difficulty, at a wage of Mex. $0.30 or Mex. $0.40 per day. These are first class workers but for less efficient workmen the wage paid is Mex. $0.26 per day, and for boys on less strenuous work Mex. $0.20 per day.

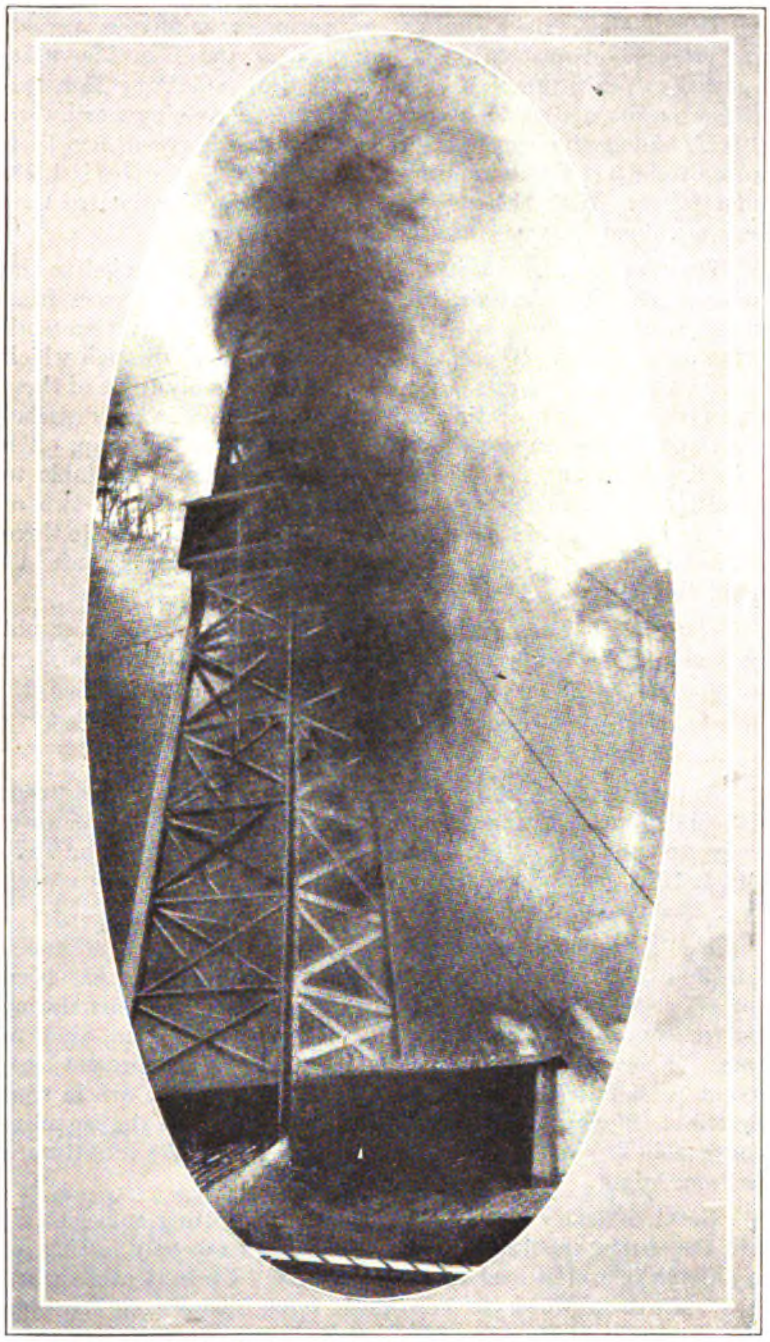
The Tien Pao Coal Colliery is capitalized at Mex. $100,000 with four-fifths of the capital paid up. Much of this has been lost as a consequence of military operations in the district during the frequent civil disruptions that occur in China from time to time. Money is at a low ebb with the concern at the present time and it is said that they do not expect even foreign aid in that direction. Money is also owed on loans so that unless the organization is able to put its financial affairs in proper order its future is far from bright.

Great difficulty is being experienced in getting sufficient air into the shafts, the 12-foot fan at present in use only forcing air to a depth of a little over one hundred feet. Up to the time when they opened the third pit only about 1,700 tons of coal had been brought to the surface from the other shafts. In the third shaft was found a good coal seam but floods and other difficulties prevent a reasonable excavation. Pumps and other modern mining contrivances are badly needed.

From what can be gathered there is a good supply of coal in the vicinity and if the Tien Pao Coal Colliery could be operated on modern Western lines, and under foreign supervision, there does not seem to be any doubt but what reasonable profits could be gained.

OIL IN JAPAN

WRITING on the necessity of establishing a national oil policy, Mr. N. Hasegawa, director of the Tokyo Oil Co., regrets that Japan is apparently without any policy regarding this article of vital importance for national defence. A Naval expenditure of Y.850,000,000 was passed at the last session of the imperial diet for a great expansion to be carried out by 1927. It is to be questioned whether the naval authorities can count upon the sufficient supply of oil to move the fleet newly constructed at so heavy an outlay. The



A Big Gusher of the Nippon Oil Company

fleet will require 2,000,000 tons of heavy oil a year in time of peace, and 50,000 tons per day and night in time of war. The present annual output of petroleum oil in Japan is 300,000 tons, and the amount of heavy oil produced is only 150,000 tons, which is only enough to meet the naval wartime needs for three days. Even this heavy oil has been used entirely by private manufacturers in the past, compelling the navy to purchase from abroad.

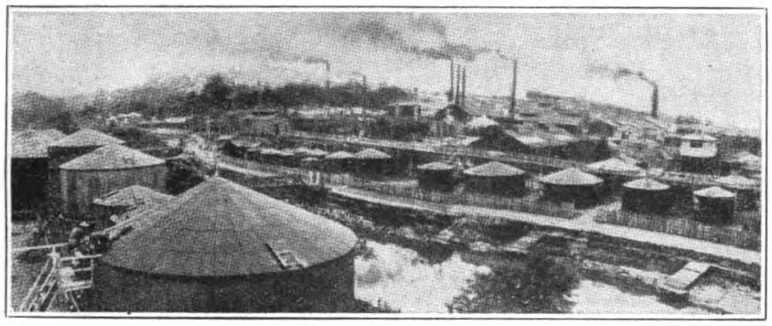
This will be sufficient to convince one of the urgent necessity of establishing an oil policy. There may be different means of carrying out that policy, but in the writer's opinion, the most important is to develop the oil-fields in our territories, so that we can produce our own supply. The question is then whether Japan possesses so many oil-fields. The oil-fields cover a vast zone from Formosa in the south to Karafuto in the north, of which there are some 1,000 miles of oil-fields in Shidzuoka, Nagano, Niigata, Yamagata, Akita and Aomori prefectures. Hokkaido and Karafuto, which cover an area of 5,000,000,000 *tsubo*. At present the oil mining concessions in Japan extend over an area of 1,250,000,000 *tsubo* of which 10,000,000 *tsubo* form the fields operated producing crude oil to the amount of 300,000 tons a year. In California the yield of oil for 1919 reached 15,000,000 tons, which was obtained from a mining area of 100,000,000 *tsubo* out of total acreage of 3,000,000,000 *tsubo* of oil-fields. These oil-fields are less in acreage by 2,000,000,000 *tsubo* than those in Japan. Still the yield was fifty times as great as that in Japan for the same year. From this, it may be concluded that Japanese oil-fields can be much further developed. Some people argue that the oil contained in Japan is less than that in America. But the writer cannot support the argument. In about 1887 no Americans dreamed of the existing oil in California, and it was only in about 1897 that oil mining there began to develop. In Japan there are now only a few companies engaged in oil mining with a capital of tens of millions of yen.

The oil mining industry was started in Japan after the Meiji Restoration. In about 1877, a certain American geologist announced that Japanese oil-fields were not very important. Later the International Oil Co. prospected for oil at an outlay of Y. 10,000,000, but the attempt was given up, as all the oil-fields in the country were considered shallow. But when the abandoned oil wells in Echigo province were taken over by the Japan Oil Company, oil was struck at the depth of 330 *ken*. Afterwards some of the wells in Kurokawa, Akita prefecture, gave out 10,000 *koku* of oil per day and since then the industry has made rapid strides. Still only a small part of the whole oil property has been touched. How will the question have to be solved? The writer memorialized the government and the imperial diet on the question during the last session, and it is gratifying to note that the question has now come to be earnestly discussed. The Seiyu party has led other political parties in instituting investigations and is said to have adopted a plan for its satisfactory solution by which it is proposed that the government should draw up estimates for working uncultivated oil-fields in the Japanese territories and submit them to the 44th session of the imperial diet, that the imperial navy to which all business regarding the development of these oil-fields may be left, should entrust private oil manufacturers with the work of prospecting and mining oil, for which it should bear half the necessary expenditure and that the oil concessions producing oil in these fields may be acquired by the government at a suitable price. In this way, the big oil companies so capitalized and equipped as to mine oil on a large scale could sink numerous wells at once. We may also count upon the work of small capitalist, who have hitherto discovered many oil-fields.

One most important thing to do in this connection is to prepare maps which do not at present exist showing lands of the territory stratum in Japan and details concerning this stratum, based on practical survey, so that we can discover the oil-fields according to the distribution shown on the maps. This is too important and difficult to be undertaken by individuals but may be done by the government, which is urged to take it in hand at the earliest possible date.

If the oil question is not solved, the naval expansion will be meaningless. Since the imperial diet approved the naval

program, it ought to also do something towards the satisfactory solution of the oil question. The world's powers are very enthusiastic over the oil question not only for the sake of their navies, but also for meeting the demand of the age that merchantmen have also to be moved by heavy oil. Besides the uses of kerosene



Kashiwazaki Refinery of the Nippon Company

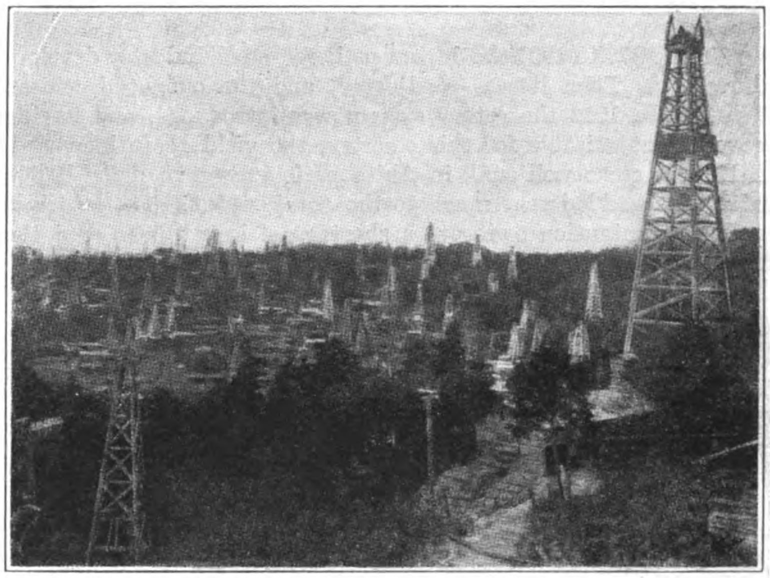
oil are extending in industrial and other lines, and it is absolutely necessary for the development of national strength and for national defence. It is to be most earnestly desired that the government and people should unite in developing the national oil industry.

No investigations have been made public in Japan as yet as to the amount of kerosene oil available in the country. At the end of 1919, there were in Japan 559 kerosene oil concessions granted covering a total area of 72,807,000 *tsubo* of which 225 with a total area of 38,119,000 *tsubo* were being operated and 334 with an area of 34,588,000 *tsubo* were suspended. Besides, there were 1,958 mines with an aggregate area of 1,095,037,000 *tsubo*, being prospected on the same date. Thus, the mines worked, suspended and prospected cover an area of 1,200,000,000 *tsubo*, which is 0.85 per cent. of the total area of Japan. The proportion is greater than the 0.26 per cent. in the United States. The amount of capital invested in the oil industry in Japan is, however, limited and is only Y.60,000,000 as against some Y.10,000,000,000 in the United States. Moreover, only 6 per cent. of the concessions are actually mined, the rest being simply retained by the owners. The yield of kerosene oil in Japan is, therefore, only 0.6 per cent. of the figure in the United States. The following table shows the areas of kerosene oil mines worked and prospected in Japan in July, 1918:—

District	Mines Prospected *Tsubo*	Mines Worked *Tsubo*	Total *Tsubo*	Proportion Per cent.
Niigata ...	457,278,149	48,613,971	505,892,120	44.5
Akita ...	306,937,515	11,168,050	318,105,565	28.0
Hokkaido ...	144,511,693	8,117,777	152,629,470	13.4
Yamagata...	84,501,375	344,844	84,846,319	7.5
Aomori ...	48,650,460	1,035,436	49,685,896	4.4
Nagano ...	13,701,874	653,354	14,355,228	1.3
Shidzuoka...	6,728,307	1,512,760	8,251,067	0.7
Other ...	—	—	2,807,855	0.2
Total	1,062,309,373	71,446,192	1,136,573,520	100.0

Niigata and Akita prefectures produce kerosene oil to the extent of 99.5 per cent. of the national yield. The following table gives the oil-producing districts of Japan together with their output for 1918:—

District	Kerosene oil Quantity *Koku*	Kerosene oil Proportion Per cent.	Kerosene oil Value Yen	Natural Gas Quantity 1,000 C.F.	Natural Gas Proportion Per cent.	Natural Gas Value Yen
Oshima (Hokkaido)	11	0	151	0	0	0
Ishikari ,,	5,318	0.3	97,642	0	0	0
Kitami ,,	1,447	0.1	19,857	0	0	0
Iburi ,,	796	0.	11,579	0	0	0
Yamagata Prefecture	247	0	1,604	0	0	0
Akita ,,	835,491	39.0	9,876,691	299,060	32.3	115,233
Niigata ,,	1,297,725	60.5	20,381,449	627,227	67.7	1,072,977
Shidzuoka ,,	1,372	0.1	26,050	0	0	0
Nagano ,,	182	0	2,394	0	0	0
Kagoshima ,,	0	0	0	344	0	288
Total ,,	2,142,589	100.0	30,417,097	926,641	100.0	1,438,118
Formosa ,,	8,101	0	146,525	0	0	0
Grand Total	2,150,690	0	30,563,622	0	0	0

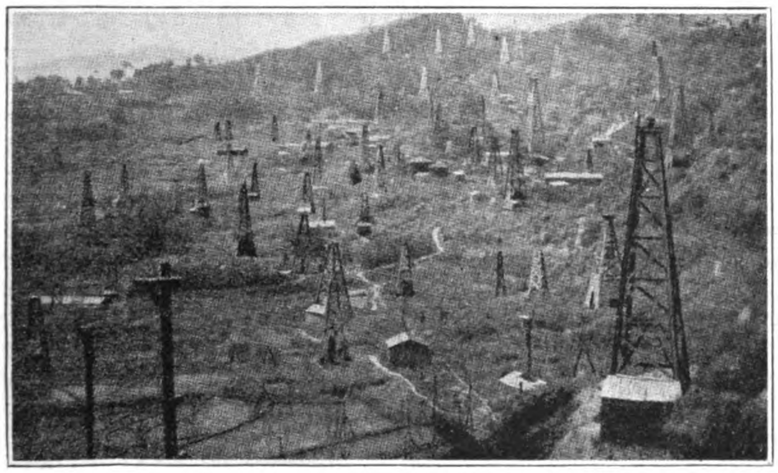


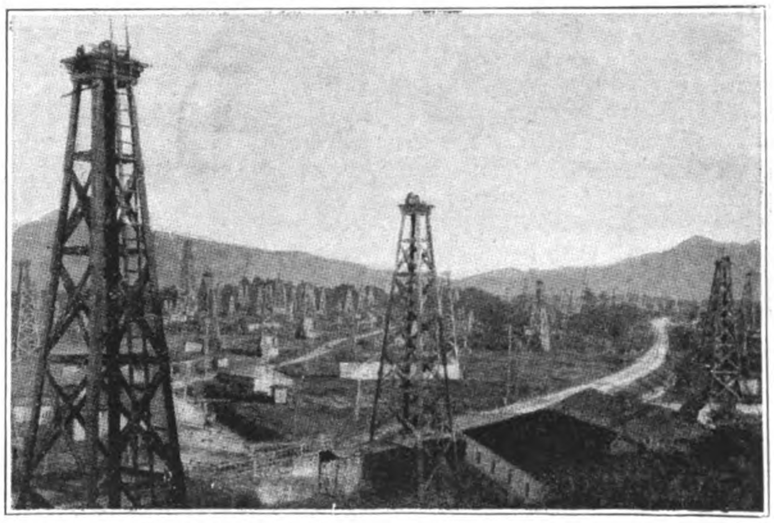
Wells of the Nishigama Oil Field, of the Nippon Oil Co.

The following table shows the production of kerosene oil since 1877:—

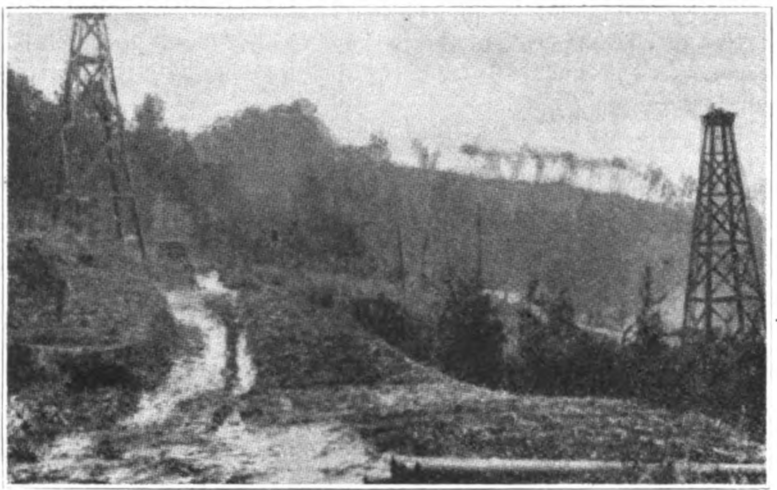
(In thousands of *Koku*)

Year	Production	Year	Production
1877 ...	10	1912	1,438
1887 ...	30	1913	1,692
1897 ...	231	1914	2,333
1902 ...	878	1915	2,613
1907 ...	1,514	1916	2,592
1908 ...	1,641	1917	2,509
1909 ...	1,657	1918	2,142
1910 ...	1,608	1919	1,987
1911 ...	1,529		

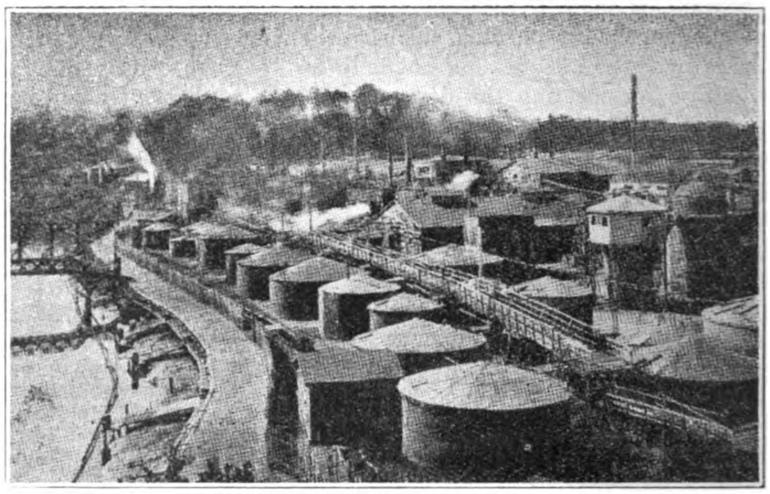




GENERAL VIEWS OF THE HODEN OIL COMPANY'S WELLS

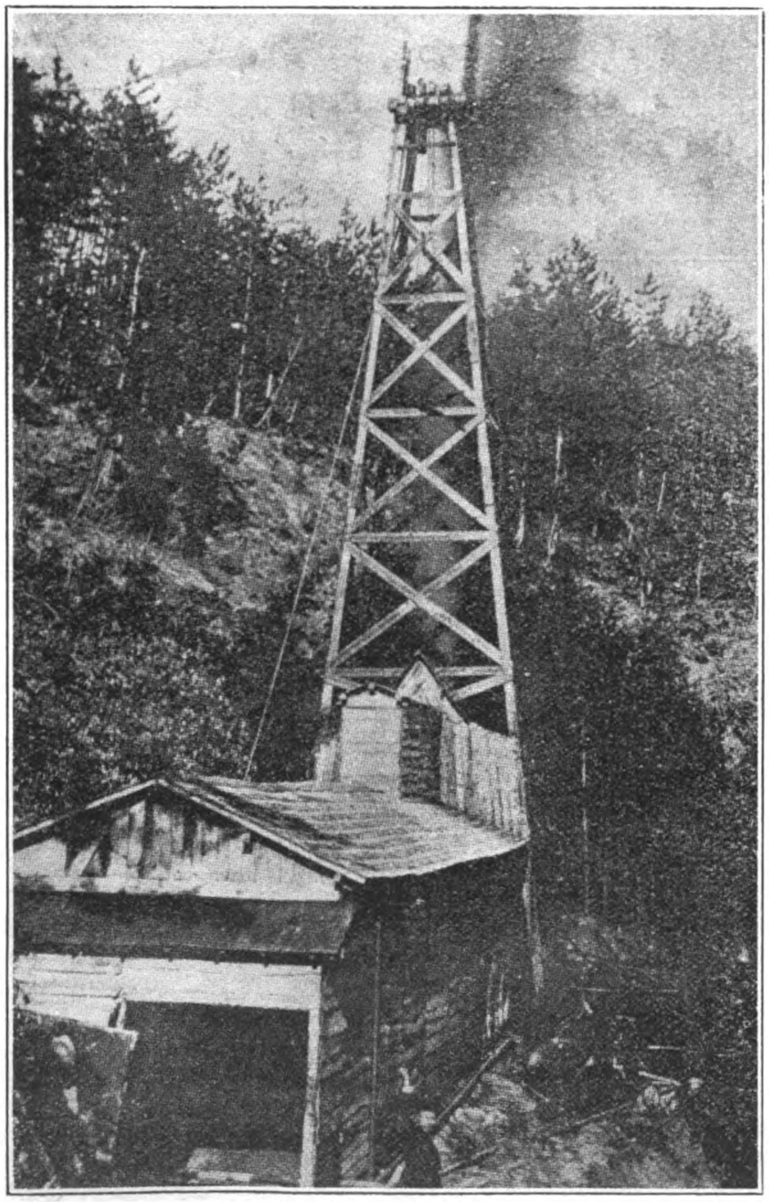


The Torikoya Field, Niigata, of the Great Japan Petroleum Company



An Oil Tank Station of the Nippon Oil Company

From 1877 to 1907 the Japanese kerosene oil industry developed rapidly. Then it was readjusted, and the output decreased slightly. In 1912 the rotary system was introduced, and having proved most suitable for this country, the yield again increased. In 1914, a great well sunk in Akita prefecture gave daily 10,000 *koku*, which added very much to the total output. The late war caused a diminution owing to a shortage of iron tubes. But the supply has much improved lately and the oil producers have resumed their active operations, which is hoped will result in an increase in the output in the near future. Classified according to kinds, the production of kerosene oil in Japan since 1907 may be mentioned as follows :



The Miyagawa Oil Field

(In Thousands of Boxes)

Year	Volatile Oil.	Lighting Oil.	Light Oil.	Heavy Oil.	Lubricating Oil.	Total.
1907 ...	179	2,790	1,324	2,875	481	7,580
1908 ...	21	2,733	755	2,399	528	5,438
1909 ...	79	2,839	820	1,440	495	5,638
1910 ...	51	2,108	972	1,630	578	5,342
1911 ...	19	2,242	811	1,458	794	5,326
1912 ...	45	2,255	841	1,285	794	5,326
1913 ...	89	3,016	772	1,253	876	6,008
1914 ...	240	3,003	1,044	1,584	968	6,839
1915 ...	227	3,022	968	4,068	1,015	9,301
1916 ...	427	3,020	1,565	4,477	1,028	10,520
1917 ...	561	2,366	2,093	3,130	1,692	9,781
1918 ...	630	1,399	2,264	2,114	1,828	8,237
1919 ...	663	1,174	2,214	1,340	1,657	7,039

The demand has not been met entirely by domestic products, and a quantity of foreign oil has been imported, the following showing the imports since 1910 :—

(In Thousands of Boxes)

Year.	Crude Oil.	Volatile Oil.	Lighting Oil.	Light Oil.	Lubricating Oil.	Total
1910 ...	1,081	66	6,896	78	210	8,334
1911 ...	988	159	6,366	95	214	7,824
1912 ...	335	224	5,681	134	315	6,690
1913 ...	351	29	4,817	168	274	5,641
1914 ...	249	178	3,545	88	263	4,325
1915 ...	476	107	3,435	122	258	4,401
1916 ...	274	70	2,227	160	288	3,020
1917 ...	334	113	1,942	116	220	2,728
1918 ...	127	275	2,327	117	473	3,320
1919 ...	251	266	3,735	176	325	4,755

From the above-mentioned tables, we can learn the amount of crude oil consumed in Japan. It may be also seen that the demand for lighting oil, which amounted to 9,000,000 boxes, including both foreign and Japanese, for 1910, fell off gradually until 1919, when it amounted to 4,900,000 boxes, owing to the extensive use of electric light. At the same time, volatile oil has been imported in increasing quantities of late years to cover what was not satisfied by the domestic output, which has been also largely increased. Volatile oil has been produced from natural gas in Niigata, Akita and other places, but the output is limited at present and the future supply is not likely to supply the ever growing requirements for motor-cars and the bean and rubber industries. This will necessitate the importation of foreign volatile oil for years to come.

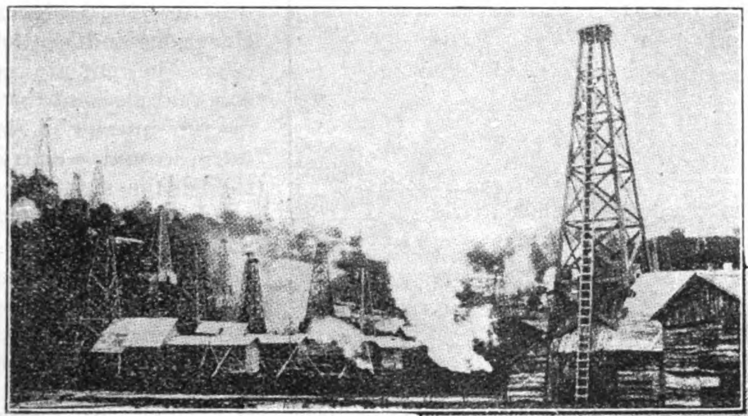
The demand for light oil for fishing motor-boats has also greatly increased and reached in 1919 a volume nearly twice as great as for 1910.

Lubricating oil has increased most steadily in demand, and for 1919 the demand was two and a half times the figure for 1910.

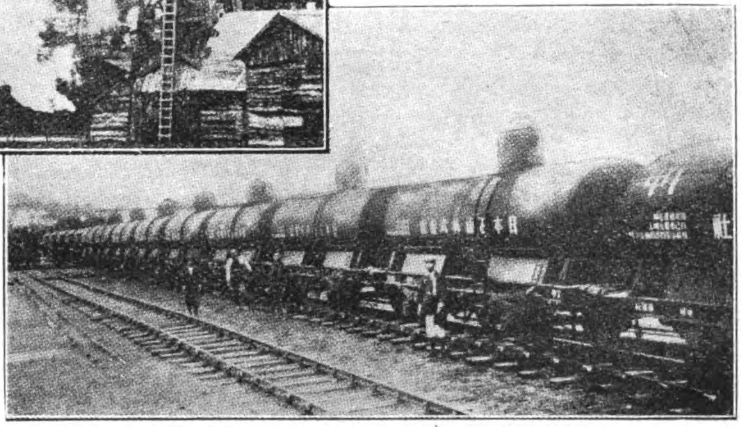
Finally, heavy oil which is most valuable as fuel for warships and merchantmen has been brought from America and the Dutch-Indies, but the exact amount imported is not known. It is said that the demand for it is about 300,000 tons a year.

The Japanese demand for all kinds of oil is increasing in much greater quantities than the growth of the domestic supply, but the writer holds that this is no cause for pessimism. Japan possesses an area of oil deposits so large in proportion to her total area as to surpass by far the proportion between both areas in the United States. There is need of improved methods of prospecting, but the work will entail much difficulty and considerable expense. The navy expended a sum of Y. 200,000 for a well of 3,000 feet in Formosa. Such a heavy expenditure for prospecting cannot be met even by a big company, much less by an individual. It is therefore desirable that the government should undertake an exhaustive geological survey so that the oil may be mined most economically and properly.

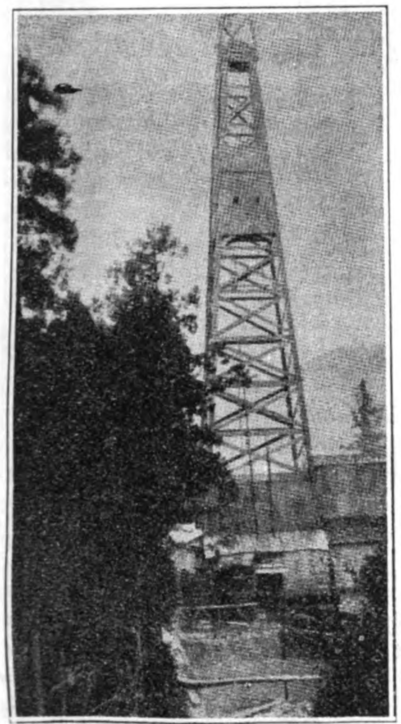
Supplementing the information above recorded is this from the pen of Mr. A. P. Scott, managing director of the Rising Sun Petroleum Co., Ltd , an extract from an article on "The History of Oil in Japan" printed in that very interesting book "Present Day Impressions of Japan"



The Kamada Field of the Nippon Oil Company



Tank Cars of the Nippon Oil Company



Rotary Well Boring Plant at Torikoya Oil Field

"In 1911 the total production of crude oil in Japan had decreased to 1,550,000 *koku* per year as against 1,830,000 three years before, and the future of the Japanese oil industry was viewed with pessimism. The cause of the decrease of production was that the shallow wells were gradually dying out, and deep wells digging takes a long time and is accompanied by many difficulties. However, the importation of a new and powerful rotary drilling machine by the Nippon Oil Company, from America, with four mechanics, threw new life into the Echigo oil-fields. The efficiency of the new rotary machine was so great that it drilled from 120 feet to 180 feet, per day of 24 hours, in the Nishiyama fields, and only two or three months were required to drill a well that would need one or two years' drilling by the rope system. One well drilled 3,300 feet in only 80 days and struck oil. The first rotary drilled well of 2,880 feet was commenced on April 5th and completed on June 23rd, and gushed 100 *koku* per day. Encouraged by these successes, the Nippon Sekiyu Kaisha installed rotary machines at Kamada, Takiya, Nagamini, Gochi and Niitsu, and these met with good results. Then the Hohden followed the example, and ordered rotary machines from America. The new machine was installed at Iriwada field, in Nishiyama district. Many others began to use rotary machines. Not only did the new machine do wonderful service itself, but it served as a stimulus to the old rope system, and the latter was much improved, and increased in efficiency. The continued prosperity of the Nippon Sekiyu Kaisha decided them to increase their capital from Y.10,000,000 to Y.20,000,000.

"In September 1921, No. 71 rotary drilled a well at Imo field, and at a depth of 443 feet struck oil, which gushed out at a rate of 600 *koku* per day. About the same time another rotary well at Kamada struck gas and blew out 6,000,000 cubic feet of gas per day. These two wells, one oil and the other gas, were then the biggest on record in Japan. The total production of crude oil in 1913 increased to 1,750,000, as against 1,470,000 in 1912.

"One of the most remarkable occurrences in the annals of Japanese oil history is that the Nippon Company's No. 5 rotary well at Kurokawa field, Akita district, struck an extraordinarily big oil deposit. The well began gushing at midnight on May 25th, 1914. By the test made at nine in the morning it gushed at the rate of nine *koku* per minute, or 12,960 *koku* per 24 hours. (One *koku* is about 47 gallons. Ed.) This Kurokawa field is at a distance of four *rin* from Akita town, and dating from very ancient times there have been oil indications. Crude cozed out of the ground and floated on top of the stream—perhaps this is why the place is called Kurokawa, or 'Black' stream.

"The news of the gushing spread all over the country at once and caused a sensation. Everybody rushed to buy shares in the Nippon Oil Company, and the prices advanced by Y.22 per share in one day! The confusion in the Tokyo Stock Exchange market became so uncontrollable that they were obliged to suspend transactions temporarily.

"The Nippon Oil Company had good luck at the Kurokawa oil-fields. There were few wells that failed. After the great gushing of No. 5 well, the No. 8 was the next largest, putting out 5,000 *koku* per twenty-four hours."

In his article Mr. Scott has dealt with the question of Japanese oil companies at some length because, under present conditions of a decreasing consumption the native production naturally remains the keynote to the oil market of Japan. The operations of the importing companies, The Rising Sun Petroleum Co., Ltd., and the Standard Oil Company, he has dealt with briefly, as, while they both have detailed organizations, the sphere of their activities is, of course, affected by the decreased consumption and increased production of the country.

Taking the annual production of crude oil in Japan at 100,000,000 gallons per annum, valued at from Y. 4 to Y. 5 per unit of ten gallons, in the open market, it will be seen that the industry is an exceedingly valuable one.

MINDANAO

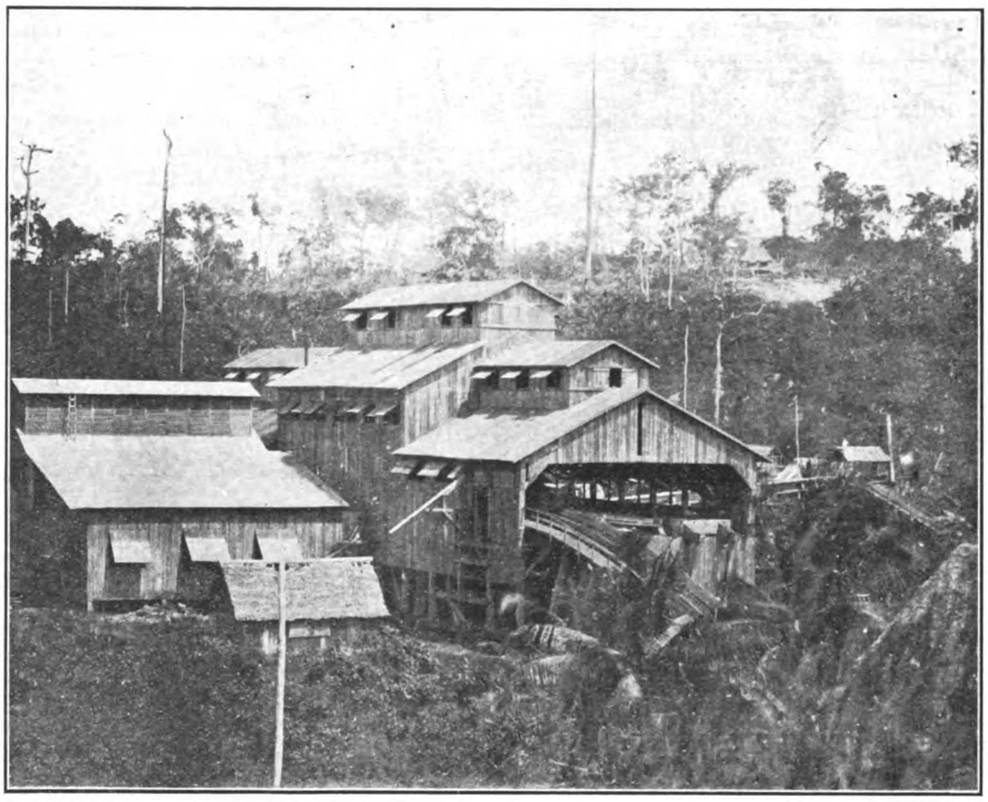
Cotabato: Its Natural Resources and Opportunities for Development

By P. J. WESTER, Agricultural Advisor

THE province of Cotabato occupying the major part of the huge peninsula that lies between the Celebes sea on one side and washed by the Davao Gulf and the Pacific Ocean on the other, is bounded on the north by Lanao and Bukidnon, on the east by Davao, and on the south and west by the Celebes Sea, and contains an area of 9,620 square miles, being by far the largest province in the Philippines. Cotabato is three times as large as Porto Rico less 1,247 square miles, which has an area of only 3,604 square miles and it is about a third larger than the Hawaiian Islands, which contain 6,406 square miles.

Of this large territory, 78.7 per cent., 1,960,530 hectares, is covered by commercial forest, 2.9 per cent., or 72,640 hectares is open grass lands; there is less than 2 per cent., of the land in mangrove swamps and non-commercial forests, while 0.6 per cent., or less than 15,000 hectares are in cultivation. Some of these figures are subject to correction, since there are 16 per cent., or 402,880 hectares of land that still remains unexplored.

Except the comparatively small area that drains into Sarangani Bay and the unexplored region on the southwest, the entire province is one vast basin of the Cotabato River and its numerous tributaries. The Cotabato River, under the name of Pulangi, originates in northern Bukidnon and is probably the longest river in the Philippines. This river is navigable for small steamers to Fort Pikit, 74 miles from the sea, nearly all the year around, and at medium high water to Kabakan, a distance of more than 100 miles from the coast.



A Modern Saw Mill in the Philippines

As one ascends the Cotabato River, the highway of the province, for several miles from the coast the banks, barely above tide water, support a vegetation of mangrove and other salt water plants. Further inland, as they rise to a higher level beyond the influence of salt water, the vegetation changes to tall grasses with here and there clumps of shrubby trees and sago palms. As the river leaves the fresh water swamps of the interior at Tumbao it branches into two arms and forms a delta country to the coast, penetrated by numerous cross channels.

Already before Cotabato, the capital of the province, is reached, a few tall coconut palms make their appearance on the low river banks. Here and there small Moro villages are passed clustering on the top of the river bank, the houses themselves scarcely visible through the thick growth of bananas and other fruit trees by which they are surrounded. Striking kapok and bangar trees meet the eye from time to time. The stately bauno is scarce, and so is the handsome, round topped, leafy inogug. Altogether, the lower part of the river is a flat, monotonous country of but little interest to the sight-seeing tourist.

Mango trees are common and the stiff Buri palm is a common feature in the landscape. The spiny bamboo also is well introduced. To the duck hunter certain sections in the swamps are a paradise. Crocodiles are common in the rivers and swamps.

At the higher elevations and on the coast the climate is cool and pleasant, but in the interior it is warm and sultry though the nights are almost invariably cool and agreeable. Rainfall observations are all too scant over the large territory under discussion, but so far as they are available they show a well distributed and ample rainfall with no prolonged dry periods.

Population

The population of Cotabato numbers 154,270, divided among Moros, Manobos, Bilans, Tirurays, Tagabilis, Dulangans, and Christian Filipinos, and a few scattered Americans, Chinese and Japanese, but by far the greater number of the inhabitants in Cotabato are Moros, belonging to two tribes, the Maguindanaos and the Iranuns. These people are widely scattered through the Cotabato Valley, and are the most advanced in civilization among the native inhabitants. Next in importance are the Manobos, who have settlements here and there in the more remote districts. The Bilans and Tirurays comprise several thousand people also living in the remote parts of Cotabato. The Tagabilis and Dulangans are very few. The Christian Filipinos live around Parang Bay and about Cotabato. Then there are quite a number who have been settled in agricultural colonies from Fort Pikit to Silik and at Glan within the past few years.

At present labor is plentiful at the few plantations that have been started, but corporations initiating development work of any magnitude would almost immediately be confronted with the problem of importing labor.

MAP OF COTABATO PROVINCE

MINDANAO

The Village of Parang, 1919

Typical Scene on Cotabato River

Agricultural Industries

In an undeveloped country like Cotabato agriculture also necessary remains in an undeveloped state. Americans who have lived in the interior say that much upland rice is grown by merely cutting down the native, wild grasses at the approach of the rainy season. Then, when the floods come and the river inundates the land the cut vegetation decays, and when the waters subside the seed rice is sown. Harvesting is next in order. So rich is the soil and so favorable is the climate that the Moros get good rice crops by this primitive method of culture.

According to Mr. Antonio Peña, chief, division of statistics of this bureau, the agricultural crops of Cotabato were in 1918 as follows :

Crop	Area *Hectares*	Quantity	Value *Pesos*
Rice	...559	*a*9,070	45,259
Coconuts	350	*b*321	*c*36,660
Corn	... 13	*a*123	739
Sugar cane	7	*b*4	306
Abaca	... 2		306

*a*Hectoliters. *b*Copra, tons.
*c*Value of all coconut products

From these figures it is readily seen that Cotabato is at the very beginning of her agricultural development.

Moro Village on the Cotabato River

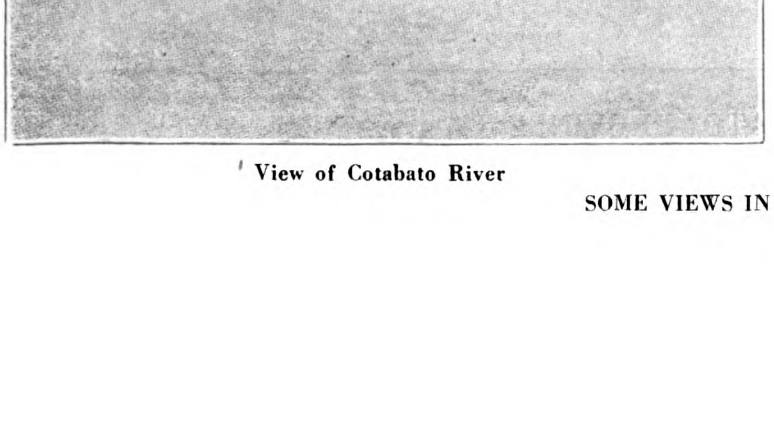
Plantations

Several smaller plantation ventures have been started but the only large plantation in operation at present is the Rio Grande Rubber Company at Kabakan, which is 1,024 hectares in extent, with about 200 hectares planted to coconuts and Para rubber. The growth of the trees is good.

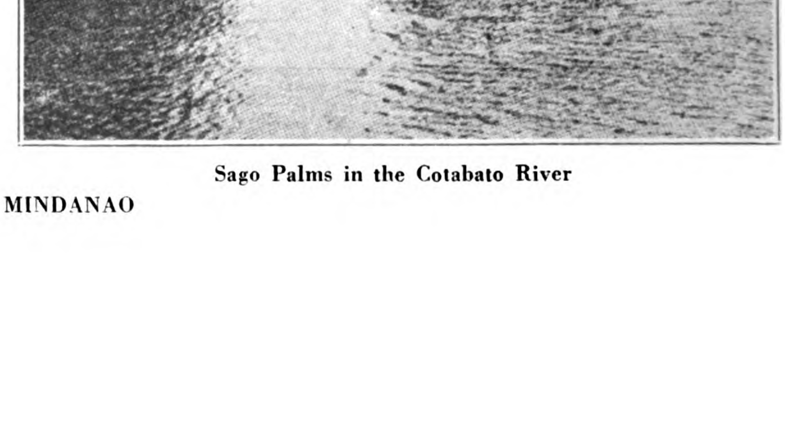
Resources and Products other than Agricultural

There are vague reports of the discovery of coal and gold in the north-eastern part of Cotabato, but these rumors have never been verified. Oil of good quality has been discovered at Kerusoy in the neighborhood of Kerupe. How extensive these deposits are is not known but if oil should be found in any considerable abundance, the development of oil wells will become of the greatest importance not only for Cotabato and Mindanao but for the entire Philippine Archipelago.

In her enormous forests Cotabato has a source of great wealth immediately available for development on a very large scale. Not speaking of the large forests in the interior, the large, almost



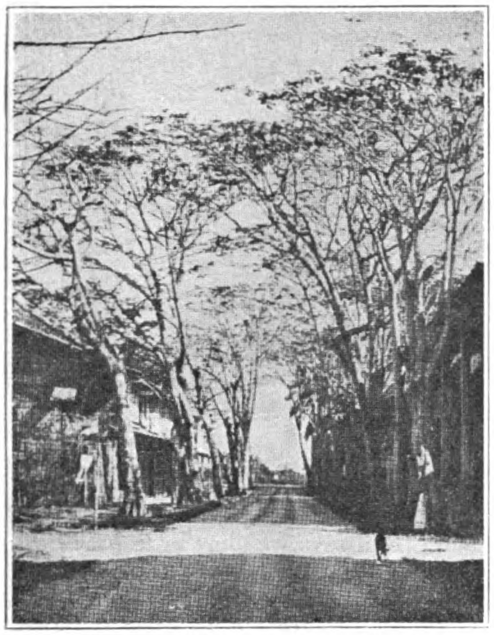
View of Cotabato River



Sago Palms in the Cotabato River

SOME VIEWS IN MINDANAO

entirely unexplored mountain range on the southwest coast from Mount Kabalatan to Sarangani Bay, a distance of some 200 kilometres, forms a solid, broad belt of commercial forests containing both hard and soft wood. Among other trees the following species of timber trees are found in the Cotabato forests: Bagtican, *Parashorea plicata* Brand; white lauan, *Pentacme contorta* M. and R.; guijo, *Shorea guiso* Bl.; lumbayao, *Tarrietia javanica* Bl.; calantas, *Toona calantas* M. & R.; camagon, *Diospyros discolor* Willd.; ipil, *Intsia bijuga* O. Ktze; narra, *Pterocarpus indicus* Willd.; acle, *Albizzia acle* Merr.: tindalo, *Pahudia rhomboida* Prain, and *Intsia acuminata* Merr.; kalamansanai, *Neonauclea* sp.; ebony, *Maba buxifolia* Pers.; kamuning, *Murraya exotica* L. and palomaria, *Calophyllum inophyllum* L.


Street in the Town of Cotabato

At present three sawmills are in operation in the province, one large mill in Lebak and two smaller ones in the town of Cotabato.

Some almaciga, gutta percha, besswax, lumbang nuts and bejuco are gathered in the forests and marketed, but the quantities obtained could be multiplied again and again, and tanbark in large quantities could be obtained for export from te mangrove swamps on the coast.

The hills south of Cotabato from Tamontaka to Awang contain a sticky, plastic clay which on investigation may be found of value for the manufacture of pottery, tiles and bricks.

The waters on the coast abound in fish of excellent quality.

Communications and Transportation

The almost total lack of good roads is not the hardship one might suppose since the Cotabato River and its many tributaries are navigable for launches far into the interior and still farther inland are negotiable by barotos. For this reason most settlements are located on the rivers. Overland transportation is handled by means of pack animals.

Cotabato is connected with the outside world through the wireless station in Malabang, Lanao, and has a local telephone system connecting the principal towns in the province. The steamers *Fernandez Hermanos*, *Neil McLeod* and *Mindanao* from Manila, call at Lebak and Cotabato at irregular intervals, and the steamship *Tablas* makes monthly calls at both points. The river steamer *Hall* makes regular trips on the Cotabato River as far as Fort Pikit and Kabakan and makes occasional trips to Parang and Lebak. The *Research* makes irregular trips from Zamboanga to Cotabato.

Trade

The following table shows the exports from Cotabato from 1914 to 1918. From this it may be seen that lumber and rice are the only products of importance:—

	1914	*1915*	*1916*	*1917*	*1918*
Lumber ...	P213,747	P2,700	P153,788	P241,628	P240,047
Rice	185,975	54,362	110,099	134,387	105,624
Copra	7,183	4,556	8,173	41,420	29,436
Carabaos ...	—	—	—	—	13,220
Mats	—	1,104	—	820	12,565
Abacá ...	3,268	766	1,280	18,162	7,196
Peanuts ...	554	1,487	3,659	4,291	6,160
Palay (rough rice) ...	43,691	11,660	5,521	6,595	4,419
Fowls	—	—	—	12	4,328
Hides	324	742	—	240	2,244
Rice Bran ...	2,944	747	446	1,677	1,777
Lumbang nuts	1,438	1,455	1,482	1,628	1,094
Miscellaneous	—	—	—	—	—
Total ...	459,124	79,579	284,448	450,860	428,110

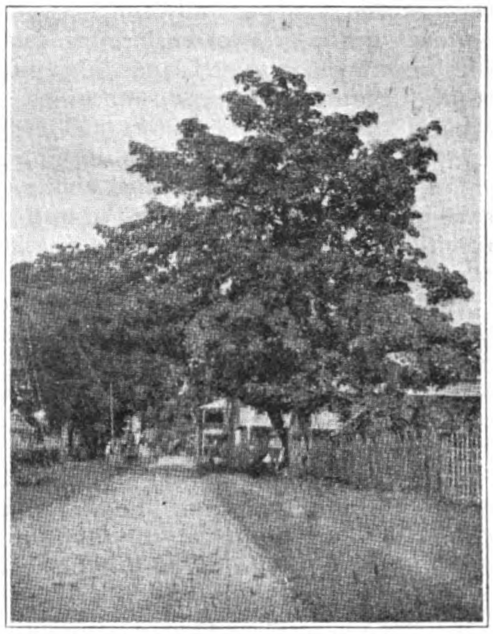
Prospective Industries and Future Development

The different provinces in Mindanao each possess individual features that appeal to the prospective investor depending upon the industry in which he seeks to engage. But no other province equals Cotabato in potential wealth or in diversity of possible agricultural and other industries. Naturally this is to a large extent due to the size of the province, but is also in part due to its geographical and geological features and the vegetation.

With a larger area in commercial forests than any other province in the Philippines, as yet practically untouched, these will for a long period of years continue to yield great quantities of excellent timber. The mills alone are lacking. The more accessible forest is, of course, that on the coastal range from the mouth of the Cotabato to Sarangani Bay, but in the interior the Cotabato, Libungan, Maridigao, Malitabug and Kulaman Rivers all penetrate virgin, commercial forests and they have a sufficiently large volume of water to permit the rafting of logs incident to lumbering.

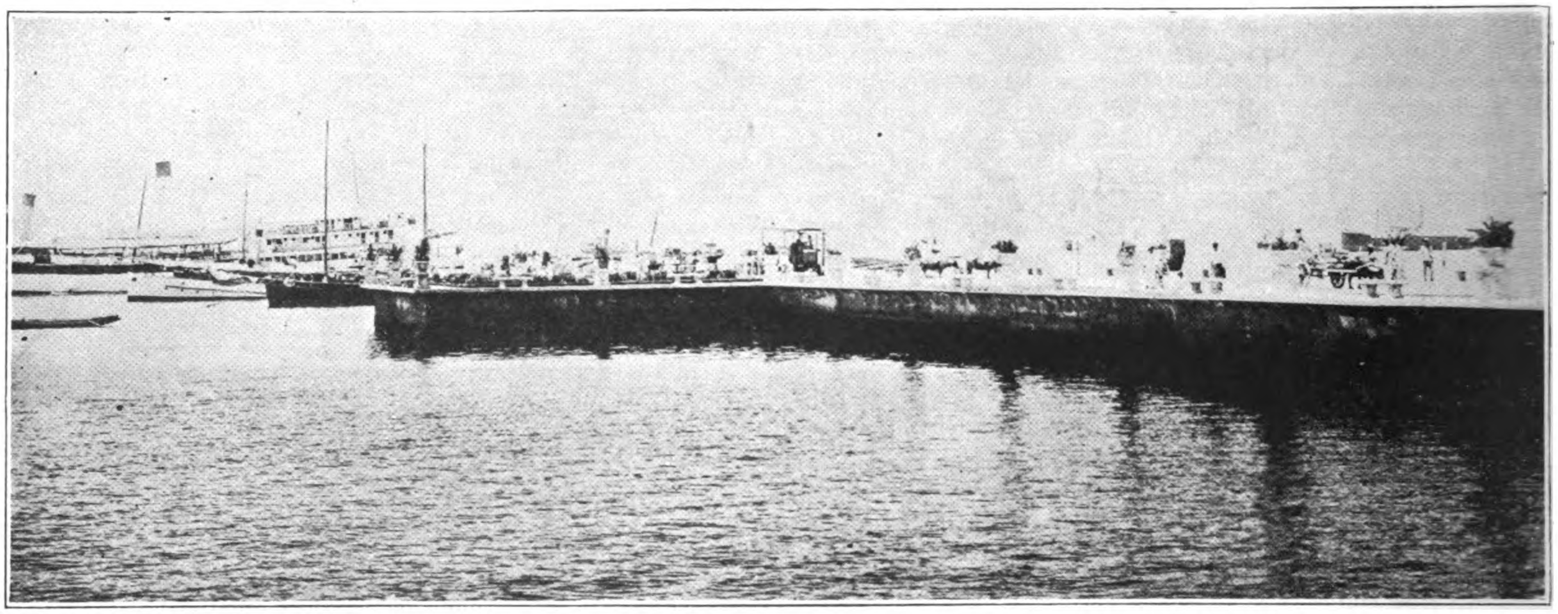
The mangrove swamps on the coast would furnish tanbark in large quantities. Rattans, almaciga and other forest products could be obtained from the interior in far greater amounts than at present.

The materialization of the hopes relative to the oil finds would be of the greatest significance in the development of the northwestern part of the province, and would give great impetus to the development of Parang into a great shipping point.


Another Street Scene in Cotabato

On the big, open, grassy plains, between Sarangani Bay in the south to lake Buluan, and on the rich, hilly pastures in the north from Parang over Buldun, to Banisilan and Bukidnon there is room for large cattle ranches.

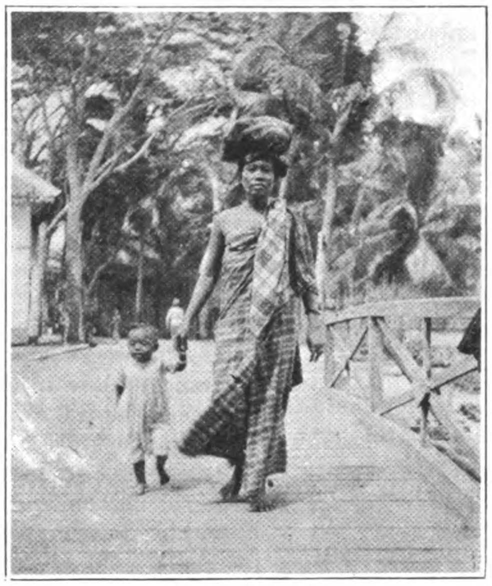
At the lower elevations the soil and climate are favorable for the production of abacá, coconuts, coffee and rubber over very large areas. Wide stretches of country continue suitable for coffee as one ascends to the higher plains north of Cotabato River, and here tea would also undoubtedly succeed well in many districts. With tractor cultivation upland or unirrigated rice could unquestionably be produced in great quantities and sugar haciendas could be opened up that would dwarf all previous similar undertakings in the Philippines into insignificance.



Zamboanga Dock, Zamboanga Province

Then, there is the delta country, the land subject to the overflow of the Cotabato River and its tributaries and the adjacent swamps, the soil of which is inexhaustively fertile.

Due to the ever present menace of inundation very little land can safely be farmed at present along the lower reaches of the Cotabato and Libungan. A region of exceptional potential wealth, it is at present a barren waste serving as a breeding ground for malarial fevers, it is a menace to health, and it bars the ready access to the more elevated, fertile country beyond. But it presents equally exceptionally vast opportunities for achievement and exploitation. The project might be financed by the national government, but a concession granted to a large corporation would probably be preferable, as that would insure more rapid development. In any event the taming of this country with all that implies, fundamentally simple, would be one of the greatest engineering feats ever undertaken in these Islands. It would require the patient perseverance of a capable staff of administrators and engineers for many years. It is a project sufficiently vast to tax executive ability of a high order, and to fascinate the man of ambition, with a desire to achieve, aside from the mere monetary returns.



A Moro Woman

The project is a big one, but the problem is simple enough and would consist of the straightening of the rivers to induce a swifter flow of water, in the lower areas supplemented by the construction of dikes to prevent inundation during flood time. The drainage would also necessitate the dredging of a system of canals in the more depressed localities ; but these would serve a triple purpose, as they would provide also a means of transportation and a source of water for irrigation in times of need. Thus, once the drainage and canal system was in working order, by the employment of tractors, on this great, level plain any of the important annual staple crops of the tropics such as rice, corn, sugar cane, tobacco and jute, not to speak of indigo, cassava and peanuts, sesame and other crops, could be grown on a, for the Philippines, unprecedented scale.

No country can develop and prosper without a transportation system adequate to handle its traffic and afford good outlets for its trade.

In the development of the transportation system the several large rivers, and the canals in the present swamp region and delta, will unquestionably play a considerable role, but railways will be the greater arteries of trade. Railways are more or less urgently needed elsewhere incident to the development of Mindanao, but nowhere is the need so great, would the road meet less difficulties in construction, and would increased traffic follow quicker than on a railroad extending from Parang along the foothills of the mountains north of the Cotabato delta and the big swamps, over Kabakan and Kidapawan, terminating on Malalag Bay, on the Davao Gulf, with a branch line curving southward east of lake Buluan to Makâr on Sarangani Bay. Excepting in the country south of lake Buluan such a road would penetrate during its entire length an agricultural land of unsurpassed fertility, which at present is practically uninhabited, and for all practical purposes is now inaccessible from the coast.

There are several good harbors on the Mindanao coast, but no other possesses so many advantages for the location of a great seaport and railroad terminus as Parang Bay. The points in its favor may be summarized as follows :

(1) The bay is large enough to shelter a large fleet of vessels.

(2) There is deep water and excellent anchorage close to the shore, and piers could be constructed at a low expenditure.

(3) The topographical features of the land around the bay for the planning of a large and attractive city are unusually good, the land has perfect drainage and a good slope from inland to the sea.

(4) An excellent and abundant supply of water is procurable within a short distance.

(5) Parang is within 45 kilometres of the oil discoveries in Pidatan.

(6) Parang is by far the nearest good harbor of any prospective importance to the coal field of Malangas—150 kilometres sailing distance.

(7) The approach to Parang of a railroad from the interior of Mindanao does not present any topographical difficulties and it is within easy reach of a very large and fertile country adapted to rice, corn, coconuts, rubber and coffee, and stock raising.

Also, one may confidently look forward to the day when Parang will be the centre of trade and shipping not only of Cotabato province alone but quite possibly of the entire Island of Mindanao.

Industries of Mindanao and Sulu

Forest.—The lumbering industry in Mindanao-Sulu is progressing daily and the existing sawmill companies are constantly endeavoring to increase the capacity of their mills in order to meet the increasing demand for lumber. Transportation facilities have contributed to the development of this industry, there being many ships engaged in transporting lumber.

The bureau of forestry, with the co-operation of the provincial Governments of Mindanao-Sulu, is taking all measures to stop infractions committed in "caingin" making and the stealthy cutting of woods and gathering of forest products.

The tabulation below shows the average daily output since January 1, and the average number of days operated per month for the mills in this district. Those data for the smaller mills are not available.

Mills	Average daily cubic feet, board measure.	Average number of days per month operated.	Forest charges Jan. 1-Nov. 30, 1919.	Average stumpage price per 1,000 board feet of tally.
Kolambugan Lumber & Development Co	70,598	13.33	29,852.64	2.876
Mindanao Lumber Co. ...	21,778	14.5	14,652.01	4.21
Mindanao Lumber Co. (Margosatubig)	8,117.35	15.27	3,619.29	2.65
Basilan Lumber Co. ...	15,433	17.90	10,816.89	3.39
Port Banga Lumber Co. ...	13,723	20 27	9,726 47	3 128
Misamis Sawing Lumber Co.	4,033	14.18	2,495.54	3.966
Lu Shio Quan and Lu Eia ...	3,465	12.72	1,590.67	3.21
Port Lebak Lumber Co. ...	12,953	25.22	22,405.21	6.23
Olutanga Lumber Co. ...	14,795.05	17.04	9,896.11	3.56

The maximum yearly capacity of all the mills in Mindanao and Sulu, assuming 300 operating days per year, is given below:

Mills.	Location.	Maximum yearly capacity. Board feet.
Kolambugan Lumber & Development Co.	Kolambugan, Lanao	13,000,000
	Naga - Naga, Zamboanga	
Mindanao Lumber Co.		9,000,000
do.	Margosatubig, Zamboanga	
Olutanga Lumber Co.		2,000,000
Port Banga Lumber Co. ...	Olutanga, Zamboanga	5,200,000
Basilan Lumber Co.	Port Banga, Zamboanga	
do.		4,600,000
Dr. J. W. Strong	Isabela, Basilan, Zamboanga	
Sulu Provincial Government .		6,000,000
Port Lebak Lumber Co. ...	Maluso, Basilan, Zamboanga	
Lu Shio Quan and Lu Eia ...		1,500,000
Misamis Sawing Lumber Co .	Basilan Island, Zambaonga	
Lumarao Mill		300,000
William Lamb	Jolo, Sulu	300,000
Mr. Carlsons	Port Lebak, Cotabato	4,586,796
	Cotabato, Cotabato...	2,000,000
	Misamis, Misamis ...	1,500,000
	Sibuguey, Zamboanga	5,000,000
	Zamboanga, Zamboanga	200,000
	Davao, Davao ...	200,000

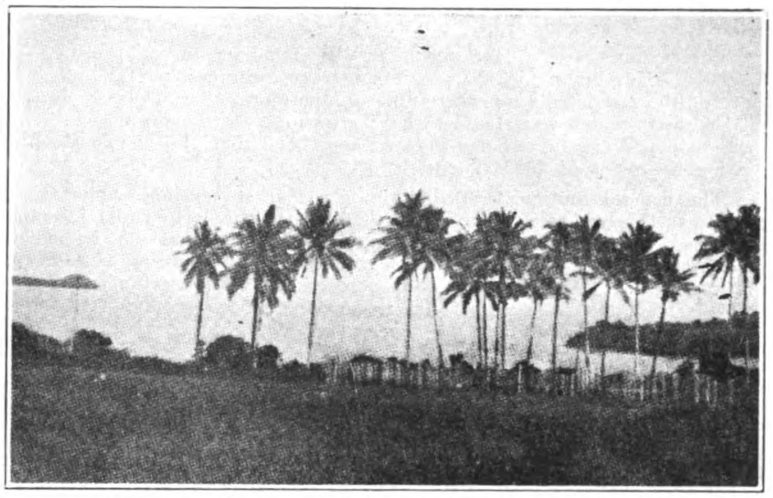
Lumbering.—The provincial government of Sulu has been logging the Jolo teak reserve. Tie makers in the province have continued to be active and as an example of their activity there can be cited the shipment of 25,000 ties in July from one license area alone.

The principal species cut by the mills in this district in the order of their abundance are: Lauans, 42 per cent.; lumbayao, 14 per cent.; apitong, 12 per cent.; yacal and molave, 12 per cent.; pagatpat, 4 per cent.; and miscellaneous, 16 per cent. Manila gets 45 per cent. of this lumber; Cebu, 15 per cent.; Zamboanga, 12 per cent.; other provinces in the department, 19 per cent.; and other provinces, 4 per cent.; and Shanghai, 5 per cent.

Sawmills.—More timber was turned out of the mills last year than in any previous year. There has been a general tendency on the part of the owners to increase the capacity of their mills. The province of Sulu has its own mill, which has been operating at the city of Jolo since last April.

Mineral Products

Of the mineral products of Mindanao-Sulu, the following may be mentioned as the principal ones: Gold, iron, copper, coal, petroleum and platinum. Gold is found in the Agusan Valley between the boundary line of this province and the province of Surigao, also in other regions in Mindanao; while iron lies along



Entrance to Parang Bay. Bongo Island in the distance

the boundary region between the provinces of Surigao and Agusan and the Pacific coast. Petroleum is found in the Pidatan region between Lanao and Cotabato, the oil springs flowing in different places and covering several miles in extent. Coal is found in Agusan and in the Dumanquilas Bay, where at present the National Coal Co. at Malangas is undertaking its exploitation. Copper is found in the coasts and mountains of Tawi-Tawi and in other points in Mindanao, while platinum is found in the northern part of Mindanao, especially in the region behind Dapitan and Dipolog.

With the exception of the coal mine, the exploitation of which is being commenced, and of the Cansuran Mining Co. which is operating in Surigao in the region close to Agusan, none of the above-mentioned products are exploited. There is an organized corporation which had registered petroleum mining claims in the Pidatan region and there are about 11,000 hectares registered under gold-mining claims in the Agusan Valley; but none of these mine deposits have yet been exploited. The Manobos of Agusan, however, are obtaining gold from the bed of the Sulibao Rivers; and the Moros are also obtaining copper in the Tawi-Tawi Islands. It would be an excellent thing for the National Development Co. to undertake the exploitation of these mineral products, which undoubtedly will bring about immense benefits.

Manufactures

No manufacture of any importance on commercial basis exists in Mindanao-Sulu. The Zamboanga Oil Co., which should be one of the biggest oil industries in the south, is not in operation, notwithstanding the fact that this company is now provided with its own machines and buildings necessary for operation. In all parts of Mindanao-Sulu there exist small manufactures of furniture, mats, hats, household goods, weaving, ironworks, vehicle-construction shops, and other similar activities, but none, however, has yet acquired any considerable commercial importance. The manufacture of tiles is calling the attention of the people of Zamboanga, and should the price thereof be reduced a little the demand for this industry, the products of which are daily being improved, will increase. The industrial schools are fast progressing in the manufacture of furniture, hats, baskets and other household articles, and these products are gaining greater favor on the part of the public. This educational system not only trains good artisans but at the same time gives encouragement for greater production on the part of private persons who are devoting themselves to these manufactures.

FAR EASTERN IRON AND STEEL

THE IRON AND STEEL SITUATION IN JAPAN.—The pig iron market in Japan is growing still worse and the price is very irregular. It is stated by men in the line that it has almost no price to be followed as standard.

Forgers and casters have much smaller numbers of new orders on hand and their buying in the pig iron market continues to fall off. In spite of the restricted supply by furnaces, therefore, the decrease in the visible stock, which was stated to have grown more and more noticeable, is being stopped again. Some persons apprehend that the visible stock is nearing the point of 400,000 tons.

The general sentiment in the pig iron market continues under these conditions to grow weaker, and now that summer has set in and incoming news, too, fails to give any incentive it is feared that no immediate recovery is possible. The price is very irregular. Buyers, if any, can get cargoes at their bidding. Japanese coke pig No. 1 is quoted around Y.70 per ton, but it is stated that it can be obtained around Y.60.

The opinion obtains, says the *Asahi*, that the revision of the Japanese customs law and the lowering of the rate of interest by some banks have brought a livelier tone to the iron market. But the trade in America continues depressed. Steel companies there have decisively decreased wages, while there is an expectation of the price further declining in the future. To make the situation still more grave, arrivals of Belgian imports and Germany's scheme to export to overseas countries render it impossible to hope for the best. The present revival is, therefore, it is observed, merely a temporary phenomenon. Respecting sales by the Yawata Ironworks during last month they have increased somewhat in volume, but new orders are almost paralysed, as usual. Mr. Shirani, the president of the government ironworks, is at one with the Osaka journal concerning the opinion on the causes for the recent activity, and he is of opinion that the price of steel will decline to the extent of Y100 per ton. Accordingly, there will be some complicated circumstances to cope with, but the chief point is the need of economising producing costs. The government ironworks intend to effect a second decrease to the same extent as American and Belgian goods. Last year, the ironworks were in a very difficult position, in connection with the protection of iron merchants, but this year will proceed on a policy resolutely to decrease their prices in conformity with the fluctuations of American goods in disregard of the position of the merchants, and also, it might be added, in disregard of their own losses.

* * *

YAMANOUCHI & CO. of 188 Minami Sakaigawa-cho, Nishi-ku, Osaka, of which Mr. S. Yamanouchi is manager was organized recently to do business in iron and steel.

* * *

THE KATSUMA IRON WORKS was organized recently to manufacture machines and tools. Office: 192 Minami Nagai, Toyosaki cho, Nishimari, Osaka. Manager: Mr. T. Imanaka.

* * *

POOTUNG TO ESTABLISH A STEEL WORKS.—A certain Chinese merchant named Loh has proposed to establish a steel works at the Pootung Bund to produce steel supplies which are in great demand in the Shanghai market. Subscriptions to the capital fund are being called, and it is expected that the company with operate in the near future.

* * *

JAPAN PURCHASING SWEDISH PIG.—Within the past few months the Japanese navy department has purchased 20,000 tons of Swedish pig and, it is understood, it in the market for an additional 5,000 tons of this material. It is also reported that ,the department has asked for bids for a hydraulic press of 16,000 tons capacity.

The following five trade notes were submitted by Consul H. F. Hawley, as translated from the Japanese press:

* * *

THE ZATSUGA IRON WORKS was organized recently to manufacture machines for ships repairs. Office: 597 Sanchome, Kujominami, Nishi-ku, Osaka. Manager: Mr. T. Sano.

* * *

THE OSAKA TUBE MANUFACTURING CO. was organized recently to manufacture patent tubes. Office: 956 Mato ise-cho, Osaka. Manager: Shinjiro Torli.

THE FUKUMOTO IRON WORKS was organized recently to manufacture metals for ship-building. Office: 9 Itchome, Kita, Ajikawa-dori, Kita-ku, Osaka. Manager: Mr. T. Kataoka.

* * *

MEANS FOR MAINTAINING THE PRICE OF PIG IRON.—The price of pig iron is extraordinarily low; below the cost of production. Moreover, there is a great accumulation of stock being estimated at 500,000 tons, including 300,000 tons in Osaka, Kobe, Tokyo, and Yokohama and 100,000 tons in Korea and Manchuria. To maintain the market prices, a loan has recently been raised from the central bank, but the Japanese manufacturers consider it necessary to establish a union selling office and to sell their produce at a uniform price.—*Tokyo Asahi.*

COST OF IRON AND STEEL PRODUCTION IN CHINA.—Writing in the *Peking Daily News*, D. K. Lieu (former cost accountant of Hanyang Iron and Steel Works) says, iron and steel have been for centuries manufactured in this country, but not until recently, were they manufactured according to modern processes. The old method of manufacturing which is still employed in small scale production is simple and crude, and involves very low costs, chief of which are raw materials and direct labor. There is no way of finding out the exact cost in such cases owing to the variety in the composition and quality of the product. Hence our study will be confined to the manufacturing cost in the modern iron and steel works.

Of the modern works the greatest is undoubtedly that at Hanyang, owned by the Hanyehping Company, which was made particularly well known by an exchange of notes between China and Japan in connection with the infamous twenty-one demands of 1915. In serving as cost accountant of the Hanyang Iron and Steel Works in 1919 and 1920, the writer obtained first-hand information of the detailed items of cost as well as certain illustrative cost data which will be given in the following account. Costs at other works and in other countries will also be given in different connections for the sake of comparison.

COST OF PIG IRON.—We shall start with the manufacturing cost of pig iron. This, as the iron is produced at Hanyang by the blast furnace department, is made up of five items, each of which is minutely subdivided. The five items are:—

(1) raw materials; (2) direct wages; (3) manufacturing expenses; (4) general expenses; and (5) financial expenses. Under the first heading are grouped all kinds of raw materials—iron ore, manganese ore, limestone, coke, and many other varieties of iron sometimes used in place of iron ore, such as scrap iron, native white iron, reheating furnace slag and mill scale. The first four kinds of materials form the chief constituents of pig iron, because, in addition to iron and manganese, pig iron contains silica, which is obtained from limestone, and carbon, which is obtained from coke. It also contains a certain percentage of sulphur and phosphorus, both of which come from the ore itself.

The most expensive single item among raw materials, which is also the most expensive of all items of cost, is coke. For the first seven months of 1919, the figures varied from 45.7 to 55.4 per cent. of the total cost of pig iron. And yet the coke is of the best grade, only about 120 tons of it being necessary for the production of 100 tons of pig iron. The coke is produced at the company's own colliery at Pinghsiang; from coal of such a quality that it takes only about one ton of coal to produce one ton of coke. Under such exceptionally favorable conditions, it needs some explanation to justify the value per ton of coke at $20, and that of pig iron at $47 to $53. This explanation will be given in the course of this article.

THE IRON ORE.—The next largest item of cost in raw materials involved in the supply of iron from iron ore or from other substances. Of these, mill scale, furnace slag and scrap iron need hardly be considered, as they are only used to a very limited extent; and would be sold at a loss on the market if not consumed in the blast furnace or the melting shop. The native white iron used in the Hanyang works is very costly, ranging from 2 to 13.5 per cent. However, as the use of this kind of raw material is unnecessary, and as it has been used simply because the works has it in stone—being bought years ago at farcical prices—it should not be seriously considered as an important item of cost.

(To be concluded)

Engineering, Financial, Industrial and Commercial News

AUTOS

New Automobile Enterprise.—A rich Chinese merchant is said to have organized a company for running motor cars between Hengtan railway station and Hwangpei city. The company has a capital of $100,000, and the first outlay is to be made in the construction of good roads. The Hwangpei Commercial Bank in Hankow is to be the temporary office of the company.

Shanghai-Nanwei Automobile Transportation Co., capitalized at $200,000, is being organized at Shanghai to operate an automobile service on the newly built Shanghai-Nanwei road.

AVIATION

Flight from Kiushiu to Shanghai.—In connection with the proposed aerial flight to be executed in October between Kiushiu and Shanghai, the distance being 600 miles, for which the Imperial Aero-Society offers Y.50,000 as a prize, Colonel Tokunaga of the Society is now making arrangements in Shanghai regarding the landing ground, etc. Those civilian aviators who intend to participate in the flight have already commenced their preparations.

Mitsubishi Factory at Nagoya.—Y.5,000,000 will be spent by the Mitsubishi Company on the building of an aeroplane factory at Nagoya city. Aeroplanes of a French type will be built and British aviators will superintend trial flights.

Sino-American Aerial Transportation Company.—A certain Chinese merchant is planning with some American aviators the establishment of a Sino-American Aerial Transportation Company with a capital of G.$100,000 to be divided into 1,000 shares at G.$100 each. The proposed company will be organized under American law and will be operated under Sino-American joint management. The first airline it will run will probably be between Shanghai and Woosung.

Airship for Japan.—The first airship built for the Japanese government was launched by Vickers last May from their airship shed at Barrow. She is of the sea-scout class, carrying one gondola and a small crew. The ship made a satisfactory trial flight, carrying several Japanese officers. With a speed of 55 miles per hour, the craft is 175-ft. long, and carries a crew of five. Being non-rigid, it can be deflated and transported anywhere.

BRIDGES

Bridge Across Sumida River.—A great iron bridge, to be the biggest in the Orient, is to be built across the Sumida River, connecting the Ryogoku railway station with the Manseibashi elevated railway station.

The work on the bridge will be started in the fiscal year of 1925-6 or 1926-7. The work on the elevated electric line between the Kanda station and the Uyeno station is expected to be completed about 1923. It will have a height of about 20-ft. with walls built on both sides.

The bridge which will start from Manseibashi will turn toward the left and run over the Kanda River forming a canopy for the river to the Sumida River near the present Ryogoku bridge and across the river to the Hojo side of it. The elevation will be 40-ft. as it will run over the Kanda-Uyeno line, 20-ft. high.

A New Bridge. Java.—The Augsburg Nurnberg machine factory which is the largest German concern there have received an order to construct a bridge across the Tjitarum river between Weltevreden and Tjikampek on behalf of the state railways.

BUILDINGS

New Municipal Buildings, Tientsin.—At an extraordinary general meeting of the ratepayers of Tientsin approval was given of a building scheme for the provision of new municipal offices in the British concession at an estimated cost of Ts. 250,000. A bye-law was also passed providing for the slaughter of cattle in approved slaughter houses and inspection by a veterinarian licensed by the council.

The Kanagawa Prefectural Office will build a new middle school in Yokohama on a site of 8,500 *tsubo*.

Large Acreage Purchased by Tokyo City.—23,000 *tsubo* have been purchased by Toyko city next to the Aoyama public tomb, Tokyo, on which to build 270 houses.

New Government Buildings: Japan.—The home, finance, education, military, agriculture and commerce departments of the Japanese governments are to be housed in new buildings the cost of which will be Y.6,000,000. They will be built near Sakurada gate.

The Kobe Imperial Government Railway Department has a plan which involves the construction of a large car shed at Tenne-ji, Osaka city.

COMMERCIAL

Hirai Bros. & Co. was organized recently to import metals. Office: 18 Odenma Shio-cho. Nihonbashi-ku, Tokyo. Manager: Mr. I Hirai.

Demand for Gunny Bags.—There is a large demand in Manchuria for gunny bags. A Japanese company recently established a gunny bag factory in Mukden. Its present output is 1,200 bags daily, but it is expected that this will be greatly increased. The bags are 43 by 29 inches and of two weights, 2 and 2½ pounds. The former have been selling at 32 gold yen per 100 and the latter at 36 gold yen.

A Raw Silk Bureau.—Certain Chinese and American silk merchants have proposed to establish a raw silk investigation bureau in Shanghai, with a capital of $500,000

The Fukuda Trading Co., Lfd., 91 Nichome, Kitahama, Higashi-ku, Osaka. Manager: Mr. T. Maruyama. Established recently with a capital of Y.1,000,000 to do a general commission agent business.

Watanabe & Co. 12 Nishi-ku, Osaka. Manager: Mr. K. Watanabe, have organized to conduct a business in iron and steel machinery and tools.

Hardware Merchants.—Yoshimura Shoten & Co., 1,026 Nishi Yente-cho, Namba, Osaka. Manager: I, Yashimura. Recently established.

The Shinano Shoten Co., Ltd. was organized recently with a capital of Y.50,000 to sell construction material. Office: 126 Shimono Machi, Nishikujo, Nishi-ku, Osaka. Manager: Mr. D. Matsuoka.

Wheat and Flour.—According to the latest report, the daily consumption of wheat for the manufacture of flour in the Shanghai market amounts to 15,500 bushels. The report also says that the total quantity of flour exported from Shanghai during June stood at 267,460 bags equivalent to 200,595 piculs.

The New China Co.—This company was organized in San Francisco recently by progressive, educated Chinese who have been in America for several years. M. C. Foo, president and treasurer, is a graduate (B.A.) of the University of California; Joseph Keh, vice-president and general manager, and Sherman Soo, general secretary and assistant treasurer, are students at the university.

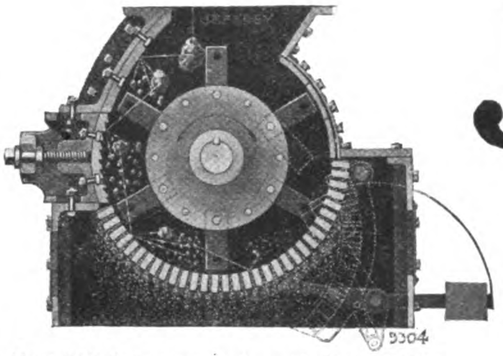
The New China Company has a branch office at Shanghai and established agencies at Hongkong, Canton, Fengtien, Swatow, Penang, S.S., and Chicago. It will conduct a general importing and exporting business, specializing on the importation of metals, ores, oils, peanuts, silks, beans, rubber, etc., and the exportation of American manufactures, more especially machinery.

Late Reports of Registration of New Corporations.—According to reports, the following new corporations have been lately registered with the ministry of agriculture and commerce :—

Shou-shing Telephone Co., Shou-shing, Chekiang.
Jui-An Electric Light Plant, Sui an, Chekiang.
Hua-Sun Weaving & Dyeing Co., Chihli.
Kiu-Dah Hosiery Manufacturing Co., Shanghai.
Hua-Dah & Co., Kiangsi.

Registration of New Corporations.—According to reports the following corporations have been lately registered with the ministry of agriculture and commerce :—

Chowshan Electric Co., Chowshan, Chekiang.
Kirin Electric Co., Kirin.
Lung-chia-shan Tin Mining Co., Lung-chia-shan, Anhwei.
Hsuan-chen Coal Mining Co., Hsuan-chen, Anhwei.
Da-hwong-shan Magnet Mining Co., Da-hwang-shan, Kiangsi.
Da-kung-shan Mining Co., Da-kung-shan, Chekiang.
Yao-yang Matches Factory, Yangchow, Kiangsu.
Ziang Sin Flour Mill, Shanghai.
Kwang Ming Dyeing and Weaving Factory, Chekiang.
Hun Shing Dyeing and Weaving Factory, Kiangsu.
Tung Shun Salt Fields Reclamation Co., Kiangsu.
Nantungchow Cotton Exchange, Nantungchow.



Type "B" Pulverizer—a fine grinding machine for hard service.

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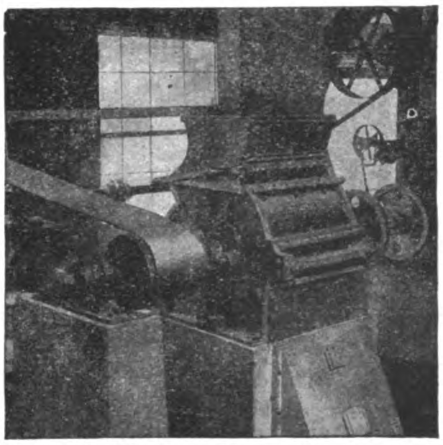
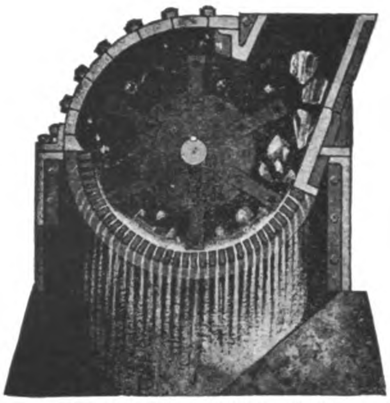


Type "B" Pulverizer grinding Limestone in a cement plant.



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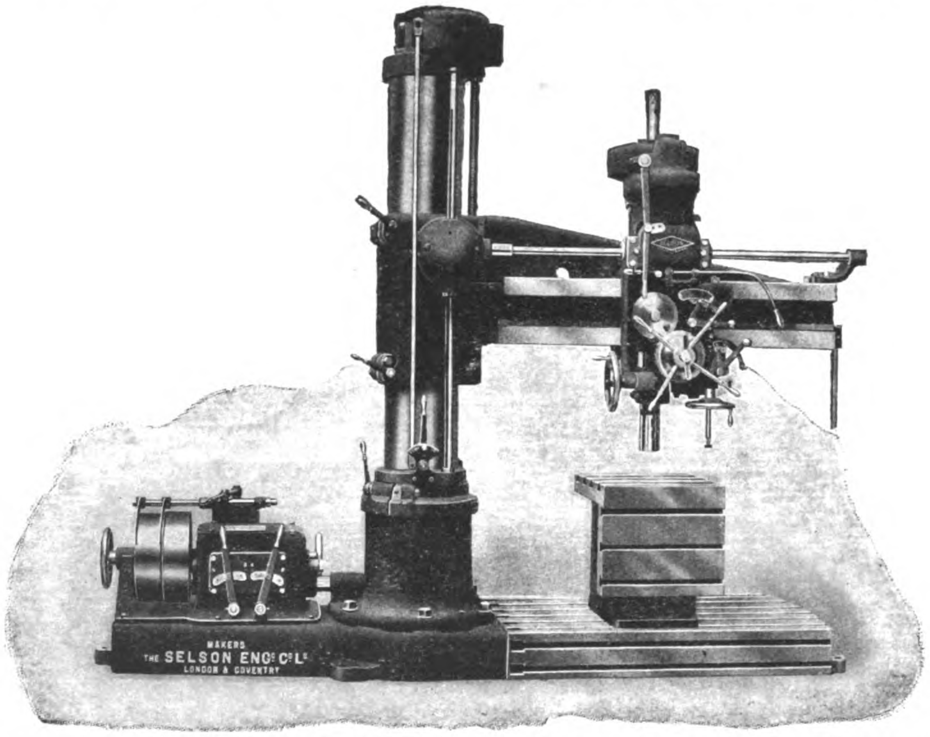

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Nantungchow Cotton and Yarn Exchange, Nantungchow.

Sun Fong Electric Co., Kiangsu.

Chin Foong Spinning & Weaving Co., Kiangsu.

DEVELOPMENT

Mongolian Development Company.—Chang Tso-lin proposes to organize an industrial corporation to develop Jehol, Charhar, and Suiyuan, with Chang Hsung, the monarchist, as its director.

Japanese Cities Embracing Suburbs.—Details of the proposed schemes for an extension of Osaka and Kobe cities have been submitted to the governors concerned by the home minister. Osaka will incorporate Sakai city and 70 other adjacent towns and villages.

A Railway and a Silver Mine.—The construction of a railway from Hueining, on the border of Korea and Manchuria, to Tienpaoshan in Kirin has been under discussion for two months or more without attracting any particular attention. Negotiations were brought to an abrupt end four days ago when the representative of the Kirin promotors died rather suddenly in the west city.

According to report there is a Chinese silver mine at Tienpaoshan, which has never paid particularly well but in which Japanese engineers have considerable faith. Some years ago the Chinese owners borrowed money from the Japanese to instal improvements but never met with sufficient success to enable them to pay off the debt. The Japanese now propose to operate the mine and make it pay and to this end prompted the Chinese interested to apply for a railway concession. The suggested line would presumably be a branch of the Kirin-Hueining railway and would be constructed on somewhat the same terms. It is said that the deal was nearly consummated when the authorized agent disappointed all parties by dying.

Harbor and Railway Improvements at Tjilatjap, Dutch East-Indies.—It is stated in a recent issue of *Eastern Engineering* that tenders are being invited for cranes, piers, godowns and other construction for the modernization and extension of the harbor works at Tjilatjap, on the south coast of Java, while railway stations and yards at Bandong, Batavia, and Soerabaya are to be reconstructed at the cost of several million florins. The naval dockyard at Soerabaya is also to be extended and new docks, wharves and piers, in addition to other works, are planned. The Netherlands East Indies government intends to spend approximately 5,500,000 florins on the Soerabaya dockyard during 1921. The municipality of Bandong is considering the establishment of a motor omnibus service in the environs of that town, while a new railway terminus station is to be constructed and shared jointly by the Netherlands Indies Railway Co. and the Netherlands Indies State Railways.

ELECTRICITY

New Electrical Combine, Japan.—The Sanyo Hydro Electric Company, capitalized at Y.7,750,000, and the Yehine Hydro Electric Company, capitalized at Y.3,000,000, have amalgamated with an increased capital making in all Y.12,550,000. Mr. T. Hiraga is the president.

New Combine, Japan.—The Kinugawa Hydro Electric Company and the Kinugawa Industrial Company have amalgamated.

The Imperial Electric Light Co., Ltd. was organized recently with a capital of Y.18,725,800, one half paid up, for general electric enterprises. Office: 9 Midami Kiuroku-cho, Kyobashi-ku, Tokyo. Managing Director: Mr. B. Iunmoto.

The Yamoto Electrical Machinery Co., Ltd. was organized recently to manufacture electrical machines and tools. Office: 3430 Nishi Sugamo, Tokyo-fu. Manager: Mr. H. Fujita.

The Ichigo Electric Power Company, Ltd. was organized recently with a capital of Y.1,000,000, quarter paid up. Office: 1 Itchome, Yayesu-cho, Kajimachi, Tokyo. Manager: Mr. H. Nakajima.

Electric Light Plants, Nantungchow.—A new electric light plant named King-sing with a capital of $25,000 has been established at King-sha-tze, near Nantungchow. Another electric plant known as Kai-yuen with a capital of $50,000 has been formed at Zai-tze, north of Nantungchow. Both plants commenced operations on the same day, June 22, 1921.

The Naniwa Electric Industrial Co. was organized recently to manufacture electric machines and tools. Office: 22 Kitamori-cho, Kita-ku, Osaka. Manager: Mr. F. Fujii.

New Hydro-electric Power Plant for Philippines.—What promises to be the most extensive private venture of the kind in the Philippines is now well under way in the form of a hydro-electric project designed to furnish lighting and electric power to the provinces of Bataan and Pampamga, comprising a population of approximately 48,000, states the Bulletin of the Philippine government commercial agency. The Abo-Abo and Tiawir Rivers, believed to be able to yield a capacity of some 200 horsepower each, will be utilized for the project. Field explorations of the district from which the company will develop electric power has revealed the existence of large deposits of magnetic iron ore. The iron is known to stand a high degree of temperature and is very suitable for internal-combustion engines. Its electric treatment has proven quite successful and the company expects to be able to exploit it to a maximum degree.—*Commerce Reports.*

The Asahi Electric Industrial Co. was organized recently to do a general electrical business and to manufacture hydro dynamo wheels. Office: 1 Marikawa-cho, Hongo-ku, Tokyo. Manager: Mr. K. Tanaka.

A New Power House Planned.—The Toshin Electric Company which amalgamated some time ago with the Meiji Electric Company plans to construct a new power house (10,000 kilowatts) from which power will be supplied to the cities of Tokyo and Yokohama.

New Electric Tramway, Japan.—The Nankai Railway Company has been granted a permit by the department of railways for the extension of its electric service between Hiranogo and Kashiwabara, towns in the suburbs of Osaka.

Tokyo's Electric Light Co.—In commemoration of the 35th anniversary of the establishment of the company, the shareholders of the Tokyo Electric Light Company have voted a million yen to the municipality for public welfare. The donation is to be used for the development of electric enterprises in the city.

Branch Electric Light Plant, Nanking.—It is reported that the branch electric light plant of Nanking will operate on July 1st.

New Electrical Machinery, Wuhu.—The Ming-Yuan Electrical Plant has issued a notice stating that until the installation of new machinery is completed, the installation of lamps to the public will be temporarily suspended.

Chinese Electric Plant, Peking, has recently purchased new equipment to be installed in their newly built station at Shihchinshan, west of Peking.

Electrical Developments, N.E.I.—There are indications of a great development in the generation and use of electricity throughout the Dutch East Indies. Extensive investigations are being made into the water power of the various rivers with a view to the electrification of the railway and tramway systems. Housing and building schemes in all the large towns and seaports in Java and Sumatra call for supplies of electrical apparatus of various types.

Hydro-Electric Plant, Sunning.—Chen Yi-hee, the founder of the Sunning Railway, expects to organize a company with a $2,000,000 capital to be mostly subscribed from natives of the Sunning district in America, to supply electricity for Sunning generated by power from a nearby water-fall. As soon as the proposed capital has been fully subscribed, the necessary machinery required will be ordered.

Water-Power Development, Netherlands Indies.—New projects for the development of water-power in the Netherlands East Indies continue to be launched. Work on a power-station in the Residency of Batavia was commenced last year, and when finished more than 50,000 horse-power will be generated. The current from this station is designed to electrify the Batavia railway and to supply light and power to the towns which the railway serves, among which Tandjong, Priok, Batavia, Meester Cornelis, Buitenzorg, and Soekaboemi. In the Preanger Regencies a plant is under construction having an initial capacity of 3,300 horse-power, and as soon as this is running an additional water reservoir is to be constructed so that the power may be doubled. On a tributory of the Tjisadana, to the west of Buitenzorg, still another station is to be erected,* and the machinery at this third point of generation is calculated to turn out between 25,000 and 28,000 horse-power units. The preliminary plans for this work have already been completed, and as soon as the machinery can be obtained actual constructive work will commence.

FORESTRY

Harbin Forestry.—An extensive district situated north of Yi-me-pu, Harbin, covering 170 *li* in length and 20 *li* in width, has been found to be suitable for the growth of willow trees. A capital of $1,000,000 is required to develop the project.

GENERAL

Fishery Company Established at Tsinan.—According to Tsinan Chinese papers, certain local gentry named Tung Yu-mei, Lü Ching-san, An Mou-keng, etc., have established a fishery company named Hua-Tung Yu-I Kungssu, capitalized at $7,500,000, for the purpose of fishing in the Yellow Sea and the Gulf of Pechihli by using 60 trawls and deep-sea fishing boats. Besides, the company will establish a fishery bank to accommodate fishing folk, and a canning factory.

INDUSTRIAL

Brick Factory at Medan, N. E. I.—During its first financial year extending over thirteen months the clay-industry at Medan paid a dividend of 11 per cent., while for the second year it will probably be 6 per cent., something like 8 per cent. having been written off. The Company are building an up-to-date circular kiln, capable of turning out 1,200,000 bricks per month, calculated to cost about glds. 150,000.

New Cotton Mill, Canton.—A message from Canton states that a new cotton mill, capitalized at $2,000,000, is about to be built in one of the outlying districts of Canton.

New Sugar Mill, Java.—The new sugar-mill, Sendang-pitu, situated in the north of the Diocja province, will be finished in 1922.

* Continued on page 576

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Whangpoo Conservancy Board

NOTIFICATION No. 108

Tenders are hereby invited for the following steel vessels: —

"A" One Steel Pontoon for "EE" type Priestman Grab dredging machine.

"B" One Single Screw Steel Tow Boat about 80-90-ft. long and developing about 250 horse-power.

"C" Two "Universal" Steel Non-propelling Mud Barges each having a hopper capacity of 385 cubic yards.

Specifications for each of the above items can be obtained at the Board's Office (Dredging Department), 6 Kiukiang Road. Each item should be tendered for separately; and the order for "A," "B" and "C" will be placed independently of each other.

Sealed tenders for any or all of the vessels addressed to the Whangpoo Conservancy Board, Shanghai, and marked Tenders Notification No. 108 must be delivered at the Board's office before noon on the 31st August, 1921.

The Board do not bind themselves to accept the lowest or any tender.

Shanghai, August 1st, 1921.

(Signed) H. von HEIDENSTAM,
Engineer-in-Chief.

The Japan Wire Company, Ltd. was organized recently with a capital of Y.60,000, quarter paid up, to manufacture copper, iron and steel wires. Office: 5 Roku-chome, Nishira-dori, Tsukishima, Kyobashiku, Tokyo. Manager: Mr. S. Takabashi.

Kirin Paper Mill.—With reference to the proposed establishment of a joint Sino-Japanese paper mill at Kirin, as negotiated for between ex-Military Commander Pao and Messrs. Okura & Co. (a powerful Japanese firm with Baron Okura at the head), the necessary permission was formally granted by the ministry of agriculture and commerce on the 26th last.

A Towel and Handkerchief Co. Organized.—A Towel and Handkerchief Manufacturing Co. known as Sui Tai has been established by Mr. Pai Sui-kar with capital of $10,000 at Yangtszepoo, Shanghai.

New Cotton Mill, Shanghai.—Mr. Kiang Chong-fu and others have recently organized a cotton mill known as Hua-yue at Teh-yue-lee, Nanking Road, Shanghai, with a capital of Tls. 400,000.

New Companies in Shanghai.—Nanyang Trading Co., and Kiangsi Lee-foong Flour Co., established in Shanghai, have been registered with the ministry of agriculture and commerce, Peking.

A New Umbrella Factory, Shanghai.—Mr. Kiang Sung and several others have recently established an umbrella factory outside of the West Gate, Shanghai. It is to manufacture umbrellas of paper, cloth and silk in all styles.

Cloth Factories, Kashing.—In Kashing, Chekiang, two cloth factories, Ka-wu and Cha-yi, with 590 looms, are extending their plant. The Ka-wu factory is having a new building constructed, while the Cha-yi factory is just considering the plan of extension.

Machines for Pig Iron Manufacture will be made by the Koike Manufacturing Company of 432 Minami Senju, Tokyo-fu. Manager: Mr. K. Koike.

The Kyushu Paper Manufacturing Co., Ltd., was organized recently with a capital of Y. 1,100,000, fully paid up, to manufacture paper. Office, 33 Nichome, Antoji-bashi, Minami-ku, Osaka. Manager: Mr. Y. Tanino.

Ice Making and Sugar and Oil Mill Machinery, N. E. I.—In its monthly Review, the British chamber of commerce for the Netherlands East Indies draws attention to the demand for ice-making machinery, ice safes, and storage chests for foods which is ever-present, and just now is exceedingly clamant. Portable ice-making machines and small "freezers" find a ready sale in almost every town in the islands, and United States makers are making a determined effort to capture this section of the market. Mineral waters, made locally, are largely consumed, and machinery for making aerated waters which can be operated either by hand or small power motors are wanted badly. There is also an increasing demand for sugar machinery.

Modern Dying Factory, Shanghai.—A modern dying factory equipped with machinery under the style of Tah Fong with a capital of Tls. 500,000 has been formed at Tso-kar-doo, Shanghai. Machinery ordered from England has been completely installed and some British expert dyers are employed. It is the first of its kind ever established by Chinese, and there are good prospects of future development in the business.

New Metal Works, Hangchow.—The Chekiang government will establish a model metal works at Hangchow, with a capital of $200,000 to be subscribed in equal shares by provincial officials and merchants. This new works are to be divided into four departments, casting, handcrafts, electro-plating and enamel wares.

Electrical Spinning Machine Invented by a Chinese.—Mr. Kuo Hsin-geo of Hankow, an electrical and spinning expert, has invented an electrical spinning machine. A factory to build the machines is to established at Ting-Geo, Hankow. Capital is being subscribed by local merchants. A sum of $400,000 has already been raised.

Canned-Goods Manufacturer.—The Heinan Provision Co., Ltd. was organized recently, capital Y.1,000,000, quarter paid up, to can a general line of foods, in Hokaido. Office: 24 Itchome, Okaji-machi, Shitayaka, Tokyo. Manager: Mr. K. Kujirai.

The Kokusai Medicine Manufacturing Co.—This concern was organized recently with a capital of Y.10,000,000, quarter paid up. Office: 22 Sanchome, Minami demma-cho, Kyobashi-ku, Tokyo, Managing-Director: Mr. H. Hoshi.

A Rubber Goods Manufacturer.—The Sum Ichi Company, Ltd. was organized recently with a capital of Y.500,000, quarter paid up. Office: 1 Sanchome, Minami demma-cho, Kyobashi-ku, Tokyo. Manager: Mr. H. Obe.

An Aerated Water Factory.—Twelve villages in Tokyo prefecture have combined to build an aerated water factory at a cost of Y.13,909,900. Without government subsidy the plan cannot mature.

The Meiji Iron Works was organized recently to manufacture machines and boilers. Office: 10 Wakamiya-cho, Honjo-ku, Tokyo. Manager: Mr. I. Iwase.

Artesian Wells for Tientsin.—The ministry of war has purchased twenty drills for sinking wells at Tientsin at the request of the supply service of the Mukden command. The drills are needed for the Mongolian expedition, as in the desert the troops will have to rely on a water-supply from wells of their own digging.

New Cotton Mill, Tsingtao.—The Fuji Cotton Spinning Company is reported to have decided to establish a branch factory at Tsingtao on the site of 100,000 *tsubo* at the estimated cost of Y.3,000,000. Thirty thousand spindles to be fitted up in the new factory have already arrived from England.

Silk Hose Factories Needed.—Chinese-made ladies' silk hose which were selling for $24 per dozen, are now selling for $34 a dozen, as a result of the active buying among foreign buyers for firms abroad. The difficulty experienced by the foreign buyers in the purchase of these silk hosieries, explains the *Canton Times*, is that there are no large factories in China that can turn cut enough goods to meet the demand in foreign countries and great inconvenience is encountered in going to the various small factories. It is reported that as result of the great demand in foreign countries the different factories are now contemplating enlargement of their plant so as to increase their output.

Button Manufacturing Co., Chinkiang.—A button manufacturing company, known as Yung Hua, has been recently established at Sing Mar Road, Chekiang. It is said that its organization and management is similar to those of Chung Hua Co.

Large Cement Works.—It is reported that a large cement plant is to be established at Lungwha, near Shanghai. Machinery will probably be ordered from America and Europe.

A Coal Brick Press.—A government coal-brick press with a capacity of 30,000 tons of bricks yearly is about to be erected at Tandjong Priok.

A Brewery.—A Japanese-Dutch concern are about to start a beer-brewery at Bandung. The company will invest four million yen in the enterprise, which is expected to turn out 48,000 bottles of beer daily.

The Chekiang Printing Press has been registered by the ministry of agriculture and commerce.

A New Paper Mill.—According to the *Shanghai-Nippo* Sino-Japanese capitalists will establish a paper mill in Kirin with a capital of $5,000,000. It is reported that the ministry of agriculture and commerce has given its approval.

The Yedo Rubber Co., Ltd., manufacturers of rubber shoes, have established themselves at 1202 Komurai, Ozuma-cho, Tokyo-fu, under the management of Mr. Takayama.

The Nitto Tape Manufacturing Co., Ltd., was organized recently, capital Y.250,000, quarter paid up. Office: 60 Taniyama, Osaki, Tokyo-fu. Manager: Mr. M. Yamanaka.

The Matsushita Paint Manufacturing Co., Ltd., 20 Takajicho, Akasaka-ku, Tokyo. Manager: Mr. K. Yamashita. Organized recently with a capital of Y.200,000, quarter paid up, to manufacture paints.

The Mitsuwa Steel Ballbearing Co., was organized recently at 217 Nakatsu-cho, Nishinari, Osaka. Manager: T. Yamakita.

The Tsutsumi Machine Manufacturing Co., was organized recently. Office: 73 Hondasanban-cho, Nishi-ku, Osaka. Manager: Mr. S. Tsutsumi.

The Seko Sho Kai Co., 1 Gochome, Shinsakai-cho, Kyobashi-ku, Tokyo, Manager: Mr. J. Kishitomi. General hardware manufacturers.

Cigarette Factory, Harbin.—A cigarette factory to be named Pei-yang, covering 500,000 sq. ft. in area, is being organized at Tung-sze-kar-tze, Harbin. It is capitalized at $5,000,000 a greater part of which is said to be invested by General Tsao Kun, military governor of Chihli and inspector general of Chihli, Shantung and Honan. It is expected to start work at the end of the current year.

Large Paper Mill, Harbin.—A large paper mill, perhaps the largest in China, is being established at Harbin by Mr. Kuo Chung-shee, former civil governor of Kirin, with several Japanese capitalists. It will cover a total area of 1,000,000 sq. ft.

A New Cotton Mill Under Organization, Wuhu.—To meet the demand for cotton products which is limited through the existence of only one cotton mill at Wuhu, Anhwei, a new mill is being organized with a capital of $1,000,000 by some local prominent merchants. A lot of land of 100 *mow* in area has been secured for the site of the mill, and machinery is being purchased.

Chinese Cotton-Spinning Co.—A Cotton Spinning and Weaving Company will be established at Kiangchow, Shansi, with a capital of $1,500,000.

Pootung Industrial Co.—Five Ningpo merchants in Shanghai have collected $10,000 to organize the Pootung Industrial Company at Kau Chao, Pau Shan Hsien.

New Textile Co. at Shanghai.—The Feng Tien Spinning and Weaving Mill in Shanghai, a Japanese concern, is to be opened soon.

MINING

Copper Ores at Fenghuangshan, Hsu-Hsien, Anhwei.—The copper mines at Fenghuangshan about 5 li away from Hsu-hsien, Anhwei, were opened by the natives at a time during the Ming Dynasty, and traces of the workings can be, even now, easily found in the neighborhood of the mines. Special delegates have been dispatched by the ministry of agriculture and commerce and the industrial commissioner of Anhwei to make survey of the mines for several times, and on June 12th, 1921, personal investigations were again made by Messrs. Nieh Tao-long, Kao Ping-lin, industrial commissioner of Anhwei, and Mr. Chen, one of the technologists of the ministry of agriculture and commerce to ascertain the quantity and chemical composition of the deposits to see if it is worth while opening. Borings are being made, and a joint corporation under the management of provincial merchants and officials will be organized to undertake to exploit these mines if the result turns out to be satisfactory.

Exploitation of Coal Mines at Anhwei.—A company named Lee Fong has been organized by Mr. King Wu Tsen to exploit the coal mines recently discovered at Hur Loong Hwa, about 30 li away from the city of Anking. It has been registered with the industrial commissioner of the Anhwei Province.

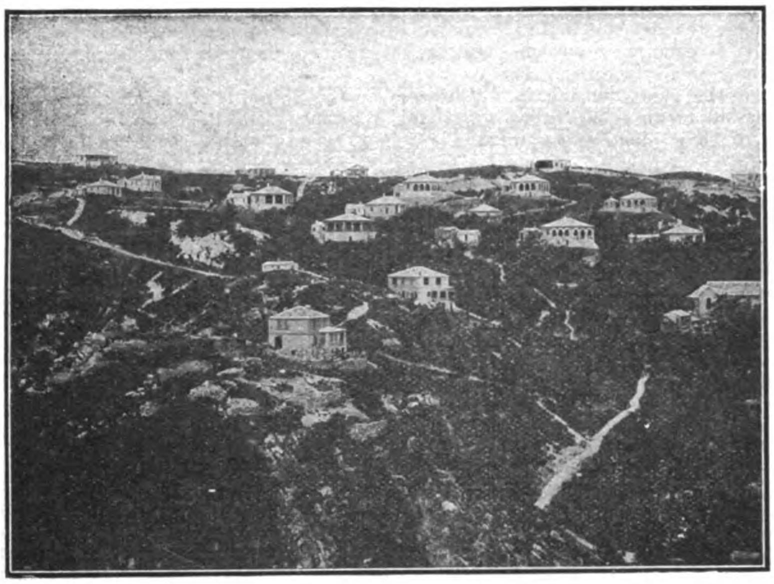
Another coal mine has also been discovered at Hwa Shan Hwa, at a distance of about 3 li from Hur Loong Hwa. According to the report of Mr. Shen, a mining expert, the deposits of these mines are bituminous coals and the quality is found to be better than that of the Kar Wong and Li Shan mines. A company to undertake the enterprise is being organized by Mr. Wong Hur Yue after its registration with the industrial commissioner of Anhwei.

Lead Discovery, Shantung.—Valuable veins of lead have been discovered at Taianhsien, Shantung. The new mining property is near Taishan, the sacred mountain. A company has been organized and $200,000 has been raised to begin operations.

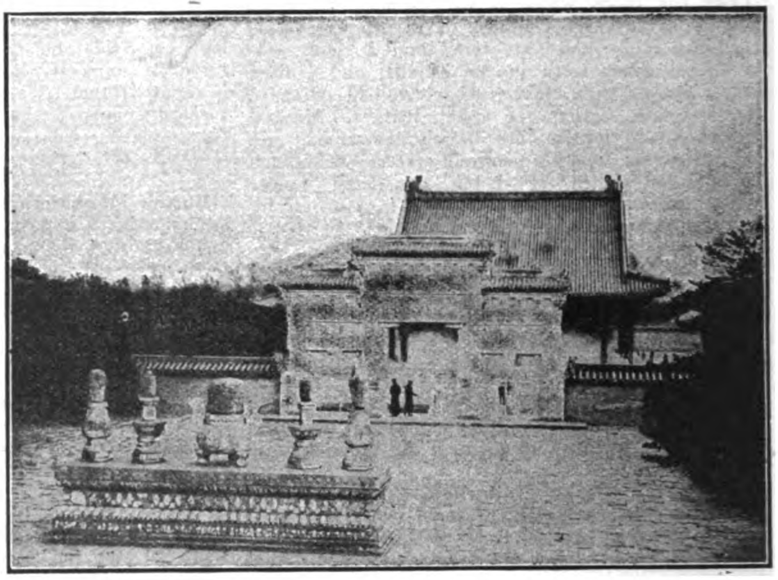
Richest Iron Ore Fields in Kiangsi.—The richest ore fields in the province of Kiangsi are found in the Yungshin district, lying south of Pingsiang, where the important collieries are situated. From every picul (133⅓-lbs.), the ore yields about 50 to 70 catties of iron (1⅓-lbs. to a catty). The smelters in the vicinity of these iron fields are said to be doing a good business by purchasing the ore direct from the takings and converting it into small handy slabs. The slabs are then transported down the river and sold to the iron foundries at Kianfu and Nanchang, the capital of Kiangsi, at $3.25 per 133⅓-lbs.

*Continued on page 576.

CHINESE GOVERNMENT RAILWAYS



SUMMER RESORT AT CHI KUNG SHAN



TOMB OF EMPEROR YU CHENG NEAR LIANG KOW CHWANG

PEKING-HANKOW LINE

"The Road Through The Heart of China"

THE Peking-Hankow Line, the most important section of China's overland route, enables tourists and travellers to get a glimpse of Old China, the train passing through magnificent scenery, traversing the great plains of Chihli, the central portion of Honan and the mountainous regions of the eastern Hupeh province.

The Peking-Hankow route joins at Fengtai the main line of the Peking-Mukden Railway, by means of which this line is connected with the railways in Manchuria, Korea, Japan, and Siberia, while steamer facilities at Hankow bring it into easy communications with the Yangtze River ports and Shanghai.

From the Capital to Hankow the journey occupies 34 hours, by the daily through train which is provided with up-to-date sleeping and dining accommodations.

In the future, this line will connect by means of a ferry-boat the Hankow-Canton Railway whose completion will bring the Capital of China, and Hankow, the Great Central Market, within easy distance of Canton the southeastern metropolie.

From the Capital to Hankow the journey about 30 hours by the bi-weekly "Express" through train which is provided with up-to-date sleeping and dining accommodations.

Chikungshan Mountain (Summer Resort).—Not many Summer Resorts in China inland, can bear comparison with the natural charming views, that reward those who ascend the mountain of Chikungshan, whose summit stands at an altitude of 1,980 ft. On reaching Sintien station, situated 110 miles from Hankow, a serpentine road climbs the mountain, on top of which are hundreds of beautiful bungalows awaiting vacationists. This popular resort is celebrated for its scenery, where an almost unbroken communion with nature can be enjoyed for a week at a time.

Hsi-ling or Western Imperial Tombs.—With their present-day accessibility, there is now little excuse for visitors to Peking omitting a trip to the Western Imperial Tombs, undoubtedly one of the most impressive sights in China. The site of these beautifully adorned Imperial Tombs is close to Liang Ko Chwang station, 79 miles from Peking, which is reached by a Branch-line, formerly built for the exclusive use of the Imperial Sovereigns when visiting the Tombs of their ancestors. The Western Tombs include the mausoleums of four Manchu Emperors and three Empresses, as well as those of a number of Princesses. The region, as a well laid-out park, closely wooded, is justly appreciated for the charming scenery surrounding the Imperial Tombs and is highly recommended to any one in search of the extraordinary and beautiful.

For Particulars, Pamphlets, Reservations, Tickets, etc., apply to the "Information Bureau" at Peking Head Office or to Tourist Agencies.

Telegraphic Address: "KINCO" **Codes: A.B.C. 5th Edition** **Telephone East 1698**

Cement Material at Chinkiang.—The earth at Changshan and Kaotze, Chinkiang, possessing peculiar features, is very suitable for manufacturing cement, earthenware made from it being able to stand rough wear. The Shanghai Cement Works at Kiangnan Arsenal has sent an expert to that locality to make a thorough investigation of the material, and experiments show that the peculiar earth can manufacture a product superior to any other brand now in the market.

Tungsten Monopoly, Kiangsi.—The government has decided to monopolise the tungsten output of Kiangsi. Merchants will do the prospecting on behalf of the government and the output will be disposed of officially. Wolfram deposits have been found in Chihli. Hunan, Kiangsi, Fukien and Kwangtung. The mineral is largely worked in the following districts of Kiangsi: Tsungyi, Tayu, Nankang, and Shangyiu.—The tungsten resources of China are more or less a matter of speculation, says the bureau of economic information.

Gold Mines Discovered, Fukien.—A gold mine covering a large area has been lately discovered at Tung-chee of Kien-er-hsien, Fukien. The deposits are found to be very fine in quality, and Mr. Liu Chung Lung has organized The Wei Ming Mining Association to undertake to exploit these mines. Two mining areas have been fixed and a survey is being made.

Shaoshing Coal Mine.—A coal deposit has been located in a hilly section of the country near Shaoshing recently. The coal is said to be of a high quality and the supply capable of withstanding eighty years of ordinary mining without exhaustion. Foreign and Chinese capitalists, including the owner of the district, have organized a company, known as the Tse Chen Mining Company, to develop the property with a capitalization of $1,000,000. The property will be opened up within a short time.

Tze-Shan Coal Mining Co.—Messrs. Shao Aulan, Chiang Yue-chien and Chao Ling-sung have established the Tze-Shan Coal Mining Co. with its Shanghai office at West Gate and it Nanking office at Ki-ziang street and with its engineering department at Lung-dai-chen. The Company will open coal mines at Shih-kar-kiang near Feng-dai village in Che-yung-hsien, Kiangsu. The coal has been found very good, containing very little impurities.

Chinese Coal Popular in South Seas.—According to those who have returned from the South Seas, a great market in that part of the globe, is offered for Chinese coal on account of the ever increasing number of factories and industrial enterprises. Those factories that are managed and financed by Chinese are desirous of using coal imported from China. More than 70,000 tons of Chinese coal are said to have been imported from China since the beginning of this year while orders for more are being placed. Telegraphic news states that the coal already received will not be sufficient to last six months and agents have already been sent to Shanghai and Canton to purchase more, principally from the provinces of Kwangtung, Shantung and Chihli.

OILS

Japanese Kerosene Oil Production.—The following gives the yield (in thousands of *koku*) of kerosene oil in Japan for the past four years, based on an investigation made by the department of agriculture and commerce:—

Kind.	1917.	1918	1919.	1920.
Crude oil	2,600	2,235	2,072	2,084
Naphtha	125	147	148	146
Lighting oil	456	398	244	185
Light oil	615	656	580	615
Lubricating oil ...	353	347	366	390
Heavy oil	549	332	198	185

Crude oil includes natural gas. The above figures show that the output of kerosene oil in Japan has decreased year by year.—*Reuter's Trade Service.*

Oil Tanks, Kowloon.—Four large oil-tanks are being constructed at the Kowloon naval depôt. It is expected that it will take several months to complete the work, which involves the laying of oil-pipes and other facilities for the conveyance of oil aboard naval vessels.

New Petroleum Island.—The Netherlands Colonial Petroleum Company have requested permission from the government to explore Obi Major, an island situated in the Batjan archipelago.

Company Amalgamation.—The Asahi Petroleum Co. has amalgamated with the Yushui Petroleum Co., capital of the new company will be Y.10,500,000.

The Standard Grease Company was organized recently with a capital of Y.1,500,000, one-half paid up to manufacture grease and substances for soap manufacture. Office: 2140 Toyoshima, Ojimachi, Tokyo-fu. Manager: Mr. Y. Nagasaki.

The Sun Petroleum Co., Ltd. is discussing the advisibility of boring at Terahaku, Ichiga province.

Japanese Oil Activities.—The Japan Petroleum Co. and the Hoden Petroleum Co., with twelve others, are now considering establishing a sales agency with a capital of Y.1,000,000 to prevent sales at cheap prices by dealers or jobbers. This plan will probably be carried out in the near future.

There are rumors of the amalgamation of the Japan Petroleum Company, capital Y.40,000,000 ($20,000,000), and the Hoden Petroleum Company, capital Y.20,000,000.

PUBLIC WORKS

Public Works in the Philippine Islands in 1920.—A total sum of $9,764,807 was spent on Philippine public works during the year 1920, compared with $8,905,645 in 1919, states the publication of the Philippine government commercial agency. This sum was spent for road construction and repair, including 198 kilometres of new roads; bridges; public buildings, including 12 markets and 47 schools; waterworks and irrigation systems, designed to benefit 300,000 hectares of agricultural land when completed in about 10 years; and extensive port improvements, providing deeper anchorages for the different ports in the islands. Artesian wells were drilled during the year at a total cost of $524,863, the 1,204 wells now in operation supplying more than 365,000 inhabitants of the islands with water.

Public Works at Changchow.—At the last meeting of the chamber of commerce of Changchow, Kiangsu, the following items regarding public works were discussed and decided upon:—

(1) That the city wall of Changchow should be repaired.

(2) That a large well should be dug to give water supply to the public.

(3) That the construction of the Tien Shee Bridge should immediately commence by asking the public for subscriptions.

RAILWAYS

New Railway Construction, Sumatra.—Surveying has been commenced in connection with the Sibolga-Batang-Toro line, and construction work will shortly be started. Reports were recently received of the surveys of territory through which will run the lines linking together the West, East and South coast of Sumatra. Under these provision is made for a line running across the island, the route lying through the Kwantan, Korintji and Indragiri districts to Tembilahan, where a new harbor is under construction, the main line sending feeders into all the surrounding agricultural districts. Railways will also serve the coal and oil centres, the south of the island, being carried through Padanag Tarap.

Peking-Mukden Rail Loan.—The loan for laying the double track on part of the Peking-Mukden line has been signed. The loan which is named partly in Peking currency and partly in British pounds, totals $2,000,000 and bears 8 per cent. interest. Interest only will be paid the first year and after that the principal will be paid in installments. The securities are the bonds of the Peking-Mukden, Shanghai-Hankow and Hu Feng Railroad lines. The first bear 5 per cent. and the last 6 per cent. interest. The government is to secure any amount not deemed to be sufficiently covered by these securities.

Suiyuan-Paotowcheng Branch Line of Peking-Suiyuan Railway.—Mr. Chow Tun-kao requests that the projected Suiyuan-Paotowcheng branch line of the Peking-Suiyuan Railway should run through Tok-hsien and Towu.

New Equipment, S.N.R., has purchased 4 locomotives and 40 freight cars.

Electrical Signals, Peking-Suiyuan Line.—The electrical signals installed on the Nankow-Kongchong section of the Peking-Suiyuan line having proved satisfactory, it is proposed to instal 64 more sets on this line.

Extension of Peking-Suiyuan Railway.—The ministry of communications has ratified the contract to supply the steel rails and sleepers by Robert Dollar & Co. for the lengthening of Peking-Suiyuan Railway to Paotoutsung.

Tzeliutsing-Fuchenhsien Railway Will Resume Construction.—The railway line from Tzeliutsing to Fuchenhsien, Szechuan, proposed by Mr. Liu Yen-tseng, a native of Fuchenhsien, is a very important line, though rather short in distance; for it is indispensable to the development of salt enterprise at Tzeliutsing. After approval by the ministry of communications in 1918, the construction was delayed owing to the military disturbances in the locality.

In the meantime, another railway from Tzeliutsing to Duntsingkwan has been built with Chinese and foreign money. Mr. Liu Teh-ling, the son of Mr. Liu Yen-tseng, has decided to continue the work and a preparatory office has been established at Yu-hsien, Szechuan.

Canton-Kongmoon Railway Proposed.—Some enthusiastic merchants said to have organized a company for the construction of a railway connecting Canton and Kongmoon, petitioned the local authorities for registration. In reply the local authorities instructed the newly organized company to supply the government with maps, detailed surveys, estimates, the capital of the company and other information before proper registration, can be made.

New Issue is Announced: Japan.—Yesterday the Japanese government announced a new issue of 5 per cent. exchequer notes to the extent of Y.11,479,300, which are of denominations ranging between Y.25 and Y.10,000. The new notes were, however, issued to the deposit section of the treasury, the general investment public have not been asked to subscribe.

This issue was planned by the Japanese government for the financing of the railway department and the government general of Formosa pushing forward their works. The rate of interest is 5 per cent. per annum, but the net price at which the issue is turned over to the deposit section is 93 per cent. This issue will be redeemed June 1, 1929.

At the close of this month Y.20,000,000 of treasury bills fall due. They will not be redeemed in cash, as it is stated. But they will be reissued in some form other than treasury bills.

Work of Sze-Tiao Railway, Fengtien.—According to report, the laying of rails on the Cheng-Pah section on the Sze-Tiao line of Fengtien was commenced on July 1st, 1921.

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Japanese Loans for Railways.—According to the *Chen Pao*, secret negotiations are being carried on between certain officials and the Japanese lenders for the signature of a formal agreement for the Kao-Hsu and Shun-Tsi Railways Loan. Japan is willing to give China another sum of Y.20,000,000, thus making up the loan to the amount of Y.40,000,000. China is going to give adequate security for the loan and to sign a proper agreement for the sum.

Another loan agreement has already been signed. Some time ago, on payment of an advance of $10,000,000, Japan was given the rights of construction on the Kirin-Haining Railway. The total amount of the loan is $25,000,000, and the net proceeds are 92 per cent. The commission is $1,200,000.

Yet another loan is under negotiation. Since the end of the late Ching Dynasty Japan has been anxious to obtain the franchise for the construction of the Tienpaoshan-Tumenchiang Railway, a line of 400 *li*, and an important branch for the South Manchuria Railway. Recently Mr. Ya-chun-lung-mu-lan, chairman of the South Manchuria Railway, arrived in Peking, but he has now left the capital with a permit for the construction of the line.

Tenders Invited.—Tenders are invited for the construction of quarters for four foreign tide-waiters at Newchwang for the Chinese maritime customs. Specification, form of agreement, and plans may be seen on application to the harbor master at Newchwang, on payment of Mex. $50 which will be returned on receipt of a bona fide tender.

New Engineers for Track Work.—The *N. C. D. Mail* states that it is reported that four engineers have arrived for the P. M. Railway in connection with doubling the track from Tongshan to Chinwangtao.

An Electric Line.—The government has given its sanction to the building of an electric railway between Hirano-go, Osaka, and Kashiwabara, Osaka, by the Nankai Railway Co., Ltd.

A Prospective Line.—Japanese interests have approached the government with regard to the construction of a railway line from Tienpaoshan to the Tumen River. The matter is now under the consideration of the ministry of communication.—*Reuter.*

South Manchuria Railway Company.—A semi-annual general meeting of the South Manchuria Railway Company was held at the Railway Association building recently, when it was announced that the company realized during the last business term a net profit of Y.35,540,774 inclusive of the amount brought over from the preceding term. It was decided upon on the occasion to dispose of this colossal amount as follows :

Legal reserve	Y.1,369,599
Dividend to shares held by government	5,445,902
Dividend to ordinary shareholders (6 per cent. per annum)	5,332,602
Special dividend to ordinary shareholders (4 per cent. per annum)...	3,555,068
Special reserve	5,000,000
Redemption fund	7,000,000
Bonuses and social expenses	500,000
Allowances to retiring employees ...	150,000
To be carried forward	7,187,601

To Build a Mentoukow-Kingshawu Railway.—The ministry of communications is contemplating the construction a railway from Mentoukow, a city situated at the west of Peking and linked up with the Lukouchao station of the Peking-Hankow railway, to Kingshawu. Officers have been dispatched to survey the line.

A Line to Benefit Alpine Club.—It is said that the Japan Alpine Club is petitioning the railway authorities to construct a new line between Matsumoto and Funatsu, Gifu prefecture.

The New Zealand Railway Contracts.—Glasgow locomotive manufacturers are very gratified at having carried off a New Zealand Railways contract for 45 engines notwithstanding American and continental competition.—*Reuter.*

Rebuilding of Lines.—The Tajima, Tsurumi line and the Tajima, Haneda lines in Kanagawa prefecture will be reconstructed at a cost of Y.372,000.

Light Railway in Shantung Desired.—A native of Shantung known by the name of Sun Chin-cheng petitioned to the ministry of communications for the permission of building a light railway between Tungtu and Poshan. After due consideration and thorough investigation, the proposal was rejected by the ministry, says the *Yih Shih Pao.*

Construction of Changtien-Sochen Light Railway Again Mooted.—During the year 1916, the talk of constructing a light railway between Changtien and Sochen in Shantung was taken up by the local Chinese gentry, but the scheme was dropped owing to business depression. According to reports from Tsinanfu, the matter has been received. It should be known that Sochen is a distributing centre, articles being shipped to Tsinanfu about 20 miles away from the mart, by means of junks sailing up a tributary of the Small Tsing River. On the other hand Changtien located on the Shantung railway line is fast growing to be a prosperous industrial town, stimulated by cotton plantation started by the Oriental Development Company and sugar-beet farms opened there by the Mitsubishi concern. The light railway under projection, when completed, will measure about ten miles.

Rolling Stock for Chinese Government Railways—Much publicity has been given the last few months to a loan of $6,000,000 (Mex.) made by a group of Chinese bankers to the ministry of communications of the Chinese government for the purchase of much-needed additional equipment for the Peking-Hankow, Peking-Suiyuan, Tientsin-Pukow and the Shanghai-Hangchow-Ningpo railways, says Trade Commissioner Frank Rhea.

While the invitation for tenders is issued by the Chinese banking group on behalf of the ministry of communications, it is for all practical purposes the ministry of communications that is buying this equipment direct for these several railways, which are all covered by foreign loans except the Peking-Suiyuan. It is true that the outstanding loans on the Peking-Hankow might be termed non-controlling, but the loans on the Tientsin-Pukow, Shanghai-Nanking and Shanghai-Hangchow-Ningpo are still restricting in many ways as to the ministry of communications handling these properties as it elects. The British-Chinese Corporation's action in calling attention to its claim that the present loan agreements give it (or its agents) the option for purchasing such materials for the Tientsin-Pukow, Shanghai-Nanking and Shanghai-Hangchow-Ningpo lines, and also claiming that the agreements provide that British materials be given preference is evidence of the restrictions which it is claimed these agreements carry in favor of the loaning nations.

Railway in Celebes.—As the new railway in South Celebes is soon about to be started, the Java States Railways intend to participate in the capital needed for the erection of a modern hotel at Macassar.

Short of Rolling Stock.—The Dutch East Indian government railways are still short of about 115 locomotives, 333 passenger-carriages and 3,101 trucks.

South Sumatra Railways.—The State Railways are building large workshops at Lahat, South Sumatra. The Palembang line is about to be extended from Muara to Lahat.

Electrification Railways, N.E.I.—The electrification of the railway from Meester Cornelis to Tandjong Priok will shortly be commenced.

Railways in Borneo.—A private company, who are applying for a contract to build a line from Bandjermasin to Amuntai (Borneo), have also petitioned the government to be allowed to build one from Pontianak into the interior.

To Connect Pangkiang with Pingtichuan: China.—Chang Ching-hui, commander-in-chief of the Mongolian expedition, wires asking the Peking government to build a railway connecting Pangkiang with Pingtichuan so as to facilitate transport.

Chinese Eastern Railway Loan.—Referring to the article in our previous issue on the 5th instant, a Tokyo telegram dated the 6th states as follows :

As a result of negotiations between the Chinese Eastern Railway and the Japanese banking group, it has been decided to hand Y.2,000,000 during June as the first advance, and Y.3,000,000 during July out of the total loan amount of Y.20,000,000. These advances are to be employed mostly for paying the employees, the remainder to be used for the construction of locomotives and other rolling stock and the purchase of rails and accessories. It is understood that the Japanese are to supply the necessary rolling stock and other materials.

Out of the above loan, Y.2,300,000 is to be deducted for payment to the South Manchuria Railway Company in settlement of the coal account due from the Chinese Eastern Railway.

New Director, Amur Railway.—The new provisional Primorskaya government appointed Mr. Katchenko, who was formerly director of the Amur Railway, to the directorship of the Ussuri Railway under date of the 28th ultimo. M. Kanari (late director of the Ussuri Railway) was taken into police custody early on the morning of the 27th ultimo.

The Railway Car Loan, Chinese Banking Group.—Tenders are invited by this banking group, on behalf of the ministry of communications for purchasing 16 passenger car underframes for Shanghai-Hangchow-Ningpo Railway. Regulations, drawings and specifications for tenders for the above mentioned underframes may be obtained from the office of the Chinese banking group upon payment of thirty dollars ($30). Tenders will be opened at 2 p.m. August 31st, 1921. As these drawings and specifications are fifty sets in all, each bidder is limited to one set only. The office of the Chinese banking group is located at the Peking Bankers Association, Hsih Bee Shih, Chienmen, Peking.

Deny New Rail Contract.—The ministry of communications has made a formal denial of the report of the conclusion of the Weihsien-Chefoo railway contract between the Shantung people and American financiers. It points out that the Shantung gentry have been working independently and have no intention of co-operating with foreign investors.

Kirin-Kwainei Railway Loan Consummated.—Concerning the Kirin-Kwainei Railway loan, for which a provisional agreement was signed with the Terauchi ministry and an advance of Y.10,000,000 was handed, negotiations were carried on between the Japanese and Chinese governments for the exchange of a formal agreement. The Japanese side proposed to appoint Japanese as chief engineer, traffic manager and chief accountant, which proposal was not agreeable to the Chinese side. Mr. Ono (vice-president, the Industrial Bank, Tokyo), after negotiating with the ministry of communications, Peking, arranged to seek some practical expediency about the supervision of the accounts, and the formal agreement was consummated.

Mr. Liu Meng-hsiung has been appointed president, and Mr. Wei director.

The Japanese banking syndicate has consented to advance Y.10,000,000 as construction funds.

Inspectors of Railways: Japan.—The department of railways has appointed several inspectors, whose function it is to inspect state rail

ways regularly with a view to keeping up the lines' best standard of efficiency.

Tenders for Iron Wanted.—The Chinese Eastern Railway is inviting tenders for about 200 tons of various kinds of sheet and bar iron. The tenders have to be deposited at their Harbin office not later than July 15.

A New Railway for Canton to Heungshan.—Realizing the pressing need for a railway to connect Canton with Heungshan, one of the richest and most important districts in the province—its annual income from revenues and taxes is said to equal that of the whole province of Kweichow—an enterprising company proposes to construct a railway between Canton and Shik-ki, the country seat of Heungshan district. Plans and estimates for the construction of the line have been submitted to the governor together with a petition applying for registration of the company as railway concern.

It is reported that the proposed railway will have its Canton terminus at Paak Hok Tung. The lines will pass through the town of Sek Pak in Pun Yi district. As soon as an investigation of the conditions of the company by the officials have been completed and proved satisfactory, registration will be granted.—*Canton Times.*

Siberian Railways Seeking Division of Equipment.—An adequate supply of freight and passenger cars for the Chinese Eastern and Chita Railways will do more than any other one thing to stabilize conditions in the rail zones, to reports from Manchuli. The roads are now trying to agree on a division of cars. The Chinese Eastern has cars belonging to the Amur line and the Amur line has demanded their return. It has been proposed that the roads agree on a car distribution for the present and make a strenuous effort in the meantime to get more cars from some source. Surveys of conditions show that there is ample business for all the cars that can be obtained in the next few years.

Proposed of Early Construction of the Tzeliutsing-Fushun Railway in Szechuan.—The ministry of communications has approved the registration for construction of the Tzeliutsing-Fushun railway in Szechuan, 55 *li* long, filed by Mr. Liu of Fu-shun. The total cost for the work is estimated at about $1,400,000, of which an amount of over $1,000,000 has already been secured and it now remains to raise the balance of less than $400,000. Actual work is expected to commence in August.

RIVERS, HARBORS, WHARVES AND DOCKS

N.Y.K. Purchase "New Dock" at Shanghai—An important shipping land deal has just been concluded between the Shanghai Dock and Engineering Co., Ltd., and the Nippon Yusen Kaisha, under which the latter company has purchased the Pootung property of the Dock Co. known as the New Dock, situated almost directly opposite the New Dock and Engineering Co.'s premises in Yangtszepoo. The New Dock property covers an area of approximately 79 *mow* and has a very valuable water frontage of 1,096-ft.

Min River Conservancy.—Construction work in the first of the three sections was practically completed when the Foochow report was in the press. It was proposed to take in the third and what may prove the worst, section immediately. The second section, which has a good channel for nearly its entire length, will be left to the last. Already a decided improvement is noticeable in the approaches to Nantai. The report says that the result of the freshets will be watched with great interest during 1921. Even with the small amount of training work in position the effect has been remarkable. One small island opposite Green Island washed away about 1,000 feet, and it is hoped that this hindrance to the free course of the current will have disappeared entirely by the end of the coming season.

Dockyards.—The Kiangnan Dockyard, Shanghai, plans to construct another dockyard on the grounds in front of the naval wireless telegraph station.

New China Port Wanted.—Chinmen, a port situated on a small island opposite to Amoy in Fukien province, is excited over a report that Japan has asked the Chinese government to make Chinmen a treaty port, according to information received there.

Harbor Works, Tjilatjap, N.E.I.—Tenders are being invited for cranes, piers, godowns and other construction for the modernization and extension of the harbor works at Tjilatjap, on the south coast of Java, while railway stations and yards at Bandoeng, Batavia and Sourabaya are to be reconstructed at the cost of several million florins. As already announced, the naval dockyard at Sourabaya is also to be extended, and new docks, wharves and piers, in addition to other works, are planned. The Netherlands East Indies government intend to spend approximately fl. 5,500,000 on Sourabaya dockyard during 1921. The municipality of Bandoeng are considering the establishment of a motor omnibus service in the environs of that town, while a new railway terminus station is to be constructed and shared jointly by the Netherlands Indies Railway Co, and the Netherlands Indies State Railways.

Sourabaya Harbor, N.E.I.—A sum of eight million guilders is to be further expended on Sourabaya harbor during the present year. At first forty millions were asked for, but so much is not available.

Manila Port Improvements.—In a recent issue of the Bulletin of the Philippine government commercial agency it is stated that the port of Manila will soon be equipped with a modern marine railway or dry dock with a capacity of 8,000 tons, according to plans launched by the Honolulu Ironworks and the Earnshaw Shipways. The cost of the project has not yet been decided and the awarding of the contract is left with the representatives in Honolulu.

Dredging of Tung Dee Dong, Huchow.—The dredging work of Tung Dee Dong of Huchow, a famous silk producing place of Chekiang, is estimated to cost $600,000, one-third of which will be appropriated from the local conservancy fund and the remainder contributed by local merchants. The survey has been made and dredging will commence shortly.

Haichow Port Works.—Mr. Tuan Shu-yun, the director of the port of Haichow, is now visiting Haichow to investigate conditions there. Until the Dutch engineer who has been commissioned to carry out the survey, has completed his task, the office of the director will remain at Nanking.

Lighthouses, Hongkong.—Plans have been prepared, and work will shortly be commenced on the erection of three modern lighthouses at Tongku, Lantong Island and the channel rocks, respectively.

Woosung Port.—According to the Chinese press, the authorities of the Woosung commercial port bureau are about to make a survey of Woosung and test the depth of the water in various parts of the river.

Famine Relief Labor in Five Districts, Chihli.—Mr. Tsao Jui, civil governor of Chihli, has instructed the magistrates of the five districts concerned to carry out the following proposed construction schemes by employing famine sufferers:

(1) In Yung-chen district: to dredge the Dahching river and build a dike along the river in co-operation with Singchen district.
(2) In Chinyuen district: to dredge Chinyuen-fu river, 135,000-ft. in length. The work is estimated to require 10,800 laborers for a period of five months.
(3) In Ansing district: to dredge rivers lying in Tientsin and Paotingfu and to erect embankments at important points.
(4) In Wuchan district: to plant rushes on both banks of the Fuyang river so as to strengthen the embankment.
(5) In Pingshan district: to dredge the upper reaches of the Tze-wu for 40 *li* and to establish a cotton mill to manufacture cotton goods, Pingshan being rich in cotton product with an annual production of more than 1,000,0000 catties.

Important Harbor Schemes: Japan.—The work of reclaiming 3,800-ft. and the building of a 720-foot seashore at Sakai Harbor, Osaka-fu, will cost Y.1,800,000.

The extension of the north embankment to 1,800-ft., and the reclaiming of 20,000 *tsubo* of land on which factories are to be built, at Wakanai Harbor, Hokkaido, is estimated at Y.2,600,000.

Y.930,000 will be expended on the construction of a 1,300-foot embankment and the reclamation of 3,800 *tsubo* at Nemuro Harbor, Hokkaido.

On which to build coal warehouses, 24,000 *tsubo* of land will be reclaimed along the seashore at Kushiro Harbor, Hokkaido. This will benefit the Taiheiyo Coal Company.

Important Sale of Land: Shanghai.—The Shanghai Dock and Engineering Co., Ltd., has made an arrangement with the Nippon Yusen Kaisha, Ltd., to sell to the N.Y.K. their New Dock property, to be used exclusively for wharves and godowns.

A Commercial Port Project.—A group of Chinese capitalists from the Straits Settlements is negotiating with the Canton authorities to charter and open Whampoa as a commercial port. An extensive scheme has been presented to the Canton government, embodying the construction of a harbor capable of accommodating ocean-going vessels.—*Reuter.*

Peking Authorities Dike Building in Manchurian Rivers.—With regard to the suggestion of the ministry of the interior, following a special investigation into the question of the construction of dikes on the rivers in Manchuria, that an appropriation of $400,000 should be made for that purpose, the Cabinet has decided that the ministry of finance should instruct the provincial financial department to draw the sum, and that the central government would make up any deficiency.

Dairen Harbor Works.—The S. M. R. Co. Harbor Works Office have commenced the work of extending the width of the second wharf of the Dairen wharves by 80-ft. on the eastern side. The eastern side of the same wharf has been closed to the berthing of ships since and will remain so till March, 1922, by which time the work is expected to be finished.

From the consideration of the berthing facility of the same wharf, its northern half is to be completed by the latter part of December next. When the work is done, that section will have over 30-ft. in depth capable of berthing ships of 10,000-ton class.

Next, a new goods storing ground covering 47,500 *tsubo* is to be laid out on the reclaimed land at Jijiko.

ROADS

Highway for Tungkun, Kuantung.—Since the inauguration of the Tungkun bureau of public works it has been decided to construct the Changmu-tau—Wei-yang road. On the 13th instant, the first sod was turned in the presence of the magistrate of the district and other prominent business men.

On the Chang-mu-tau section 600 men and women are now employed.

New Peking-Tientsin Road.—It is reported that the construction of a new road from Peking to Tientsin has commenced.

A New Road Building Company.—The Japan Roads Construction Co., Ltd. was organized recently, capital Y.1,000,000, quarter paid up, to

construct roads, asphalt, concrete and macadam. Office: 8 Shichome, Honkoku-cho, Nihonbashi-ku, Tokyo. Managing Director: Mr. S. Hori.

New Roads, Japan.—Y.74,800 will be expended on a short road from Yaizu town, Shizuoka prefecture, to Aoshi village, a distance of 3,840 *ken*.

Land Purchase for Roads: Japan.—A road will be built between Kamifushima and Nishinari-Okashi, the land having already been purchased for the purpose.

The Chu-Yang-Fu-Ping Road, Chihli.—The superintendent of construction of the Famine Relief, Tingchou Branch, Mr. Thacher Souder reports that the 60 *li* road through mountainous country known as the Chu-yang—Fu-ping Road will soon be completed, cost being in the neighborhood of $12,200. The road has two feet and a half of solid stone for a foundation and precaution against destruction by mountain torrents has been made. The road will be used both for mule and cart transport and it is hoped that it will be the means of winning back the cloth trade which has been diverted into Shensi by a road to the North. Thousands of pilgrims who travel over the road every year will greatly benefit by this good road.

Road Development in the Philippine Islands—The 20 provincial road projects, which are part of the program of the insular government for 1921, will double the length of first-class roads in the islands, bringing the total to more than 8,000 kilometers, distributed in provincial and interprovincial systems throughout many provinces. Many provincial auto and truck lines have long been in operation and new lines are being added. Some of the companies are well capitalized and operate in various parts of the islands through a general corporation, with reasonable freight and passenger charges, says the *Trans-Pacific*.

New Road, Canton.—A motor road to the famous Loh Fo Hills is projected by a supervisor of the maritimes customs administration at Canton. His suggestion is that it should start from Wang Ka Shan, immediately opposite the city of Sheklung. The local authorities are said to favor the project. It is estimated that the road will cost $150,000 to construct.

Roads for Military Service Designed, Kiangsu.—The Kiangsu provincial authorities have designed the following roads to be built for military service, in accordance with one of the provisions of the regulations governing the designing and construction of provincial roads promulgated by the president of the country some time ago:—

(1) From Nanking to Woosung via Chinkiang, Chieh-pih, Peichen, Mun-ho, Peh-chang, Sun-kiang and Kiang-yin, a distance of about 770 *li*.

(2) From Wusih to Chenkiang iva Ching-yang-tseng covering a distance of 90 *li*. This line is intended to take place of the Grand Canal when it is frozen up in winter and is not navigable.

(3) From Quo-chow to Tsing-kiang via Yanchow, Kao-yu and Pao-ying, a distance of 370 *li*.

(4) From Tsing-kiang to Hai-chow, a distance of 80 *li*.

(5) From Tsing-kiang to Hsuchow via So-chien, a distance of 180 *li*.

(6) From Pu-tseng to Hsuchow, along the Tientsin-Pukow railway (distance unknown).

Highway Construction, China.—A Chinese company, with a capital of $250,000 Mexican, has been formed for the purpose of constructing a highway from Shanghai to Linho, a distance of 20 miles, reports Trade Commissioner Meekins. This road will be surfaced with stone and will have a width of 12-ft. The work will be under the direction of the local authorities and the cost, estimated at $150,000, will be refunded to the company from the proceeds of a surtax on land contiguous to the new highway. There will be spent for motor busses $100,000. Over four routes in Northern Kiangsu and Southern Shantung, representing a total distance of 170 miles of roads, 16 American motor busses are now being operated. An additional line is planned for a new route over roads 70 miles long. Seven American motor busses are in use at Nantungchow, Kiangsu. A road is under construction at Wusih, 7 miles in length, of which less than 3 have been completed. An organization formed in Shanghai under the name of the good roads movement is advocating the construction of 260 miles of highways connecting Shanghai, Wusih, Changchow, Nanking, Hangchow and intermediary towns, the route in general forming a circuit around Taihu Lake. This route has not yet been surveyed.

Obstacles to Philanthropy.—The American Red Cross proposed to build six branches to the Tung Ling automobile road of Shantung, as follows:

(1) From Liaochen to Da-ming-fu via Quadao.

(2) From Liaochen to Lingchin.

(3) From Liaochen to Zerchang via Yangkao.

(4) From Liaochen to Wuchenching.

(5) From Liaochen to Shawhauching or Wudechsien via Yuchen and Weiming.

(6) From Weiming to Chinwooching of Chihli.

The people of eighteen districts, however, strongly oppose the project, as the roads will destroy the crops and inflict serious harm to the famine sufferers. Telegrams have been despatched to the civil and military governors by the gentry requesting cancellation of the scheme. A meeting of protest was held by the famine relief association during the later part of May, in which the following resolutions were passed:—

(1) To ask the American Red Cross to postpone the commencement of work for one month.

(2) To ask them to make good for the loss of crops destroyed by the construction of roads in case of their refusal of postponement.

(3) The proposed roads to be adjusted by making a short cut so as to reduce length and minimize the loss of crops.

Tung-Wu Automobile Road Completed.—The Tung-wu automobile road lying in the districts of Wuting and Tungchang, Shantung, constructed by the American Red Cross, has been completed, and inauguration ceremony was formally held at Yucheng on June 10, 1921.

Another New Automobile Road in Shantung.—The Famine Relief Society of Shantung is planning to build a main line of automobile road from Liaochen to Chen-tze-kow via Chenping, Kaotang, Yuchen, Ling-I, Songwu and Weiming, covering a distance of 520 *li*, and a branch line from Weiming to Chin-wu-ching of Chihli, a distance of 60 *li*, making a total length of 580 *li*. The work is estimated to require 899,500 sq. ft. of earth, with 2,000 laborers for a period of six months, at a total cost of $1,650,000. Measures are being taken to raise the prescribed amount.

To Build a Modern Road, Changchow.—As the route from Pun-new to Hsiaowu-tseng of Changchow, Kiangsu, is an important highway, the local citizens have proposed to build an automobile road between these two points and thereby to organize a limited stock company to undertake the enterprise. The capital required is being raised.

A Shanghai-Chowpu Road.—A modern road will be built between Shanghai and Chowpu, Pootung, as proposed by Messrs. Chu Ziang-peh and Mo Hsian-yao (leading local gentry) to the city magistrate.

Canton's New Roads.—With the proceeds realized from the sale of public property and a sum of $010,000 from the provincial bureau of finance, the Canton municipality will undertake to finish the first stage of road construction in the city and tenders are invited to contract for the construction of the proposed four roads which have not been completed, viz., for the construction of the Pan Fook Maloo, The Great South Maloo, and the Yet Sou Central for which bids will be accepted on June 22nd, and bids for the construction of the Mun Ming Maloo will be accepted on the 18th instant.

SHIPPING AND SHIPBUILDING

New Steamers, Nanchang.—The Chengchow Steamship Navigation Co., Nanchang, has ordered 2 launches named the *Soochow* and *Hangchow*, respectively, each having a tonnage of 19 tons, drawing 2 feet deep water, with a measurement of 55 feet long and 10½ feet broad speed of 30 *li* per hour, to ply between Nanchang and Kungchow via Fenchen, Chongshu, and Kian.

The Kiangnan Dock has decided to build another dock and has acquired land in front of the naval wireless station suitable for this purpose. The work is expected to start during the month of June.

New Steamer for Yung-Woo Steamer Navigation Co.—A new 30-ton steamer named *Chintai* having 30 H.P. drawing 5 ft. deep water, with a measurement of 75 ft. long and 14½ ft. wide, speed 30 *li* an hour, has been completed for the Yung-Woo Chinese Steamship Navigation Co. of Shanghai. It will run from Chinkiang to Tsinkiang via Quarchow, Yangchow, Kaoyue, Paoying, Weichen and Weikwan, and registration has been made with the custom house and the ministry of communications.

New Steamer for Tien-Tai Steamship Navigation Co.—The Tien Tai Chinese Steamship Navigation Co., Shanghai, has lately had a new steamer built named *Tung-Chin*. The dimensions are: Length 68 ft.; breadth 12 ft. 5 in.; draft 4 ft.; tonnage 24 tons; speed 30 *li* per hour. It will run between Chinkiang and Tsinkiang, Kiangsu and is expected to be launched shortly.

New Steamer for Hung-An Steamship Navigation Co.—The Hung-An Chinese Steamship Navigation Co., Shanghai, has built a 994-ton steamship by the name of *Wuling*, having 500 H.P., drawing 6 ft. 10 in. deep water with a measurement of 223 ft. long, 40 ft. wide, speed 7 knots per hour, to run from Shanghai to Changsha via Chinkiang, Nanking, Wuhu, Kiukiang, Hankow, Shatze, Ichang, and Yochow. It will be launched as soon as the registration with the ministry of communications has been sanctioned.

Tanksteamer Order with America.—The Japanese naval authorities have recently been negotiating with the New York Steamship Company for the building of a tanksteamer of 20,000 tons and a contract has just been concluded. The ship is said to cost about six million yen. It is the first time for the naval authorities to place an order for a ship with America.

New Japanese Oil Steamer Built in America.—An oil carrier of 20,000 tons and supplied with the new screw attachment will be built in the United States for Japan at a cost of Y.5,000,000.

Steam Launch Navigation Co., Wuhu.—The Chine Chee Steam Launch Navigation Company was established at Wuhu by Messrs. Shun Tso Zo and Wei Ya Chen to run a regular service along the Wuhu-Lu Kiang line.

Ningpo-Shaoshing Steamship Navigation Co., Shanghai, is reported to have earned a net profit of about $200,000 during the year of 1920.

Sino-Belgian Steamship Navigation Co.—Belgium has proposed to the Chinese government to organize a Sino-Belgian Mail Steamship Navigation Co., with a view to developing the trade between China and Belgium. The proposal has been carefully considered by the Chinese government, and two navigation lines have been decided upon:—

(1) From Shanghai to Anvers via Hongkong, Singapore, Bombay and Aden.

(2) From Shanghai to Anvers via Yokohama, passing through Panama Canal, touching New York and Liverpool.

Lee Wai Steamship Navigation Co., Anhwei.—Two steam launches of 12 h.p. each have been added to the fleet of the Chinese Lee Wai Steamship Navigation Co., Anhwei: one named *Yu-foo* having a tonnage of 8, drawing 3 ft. 5 in. deep water, with a measurement of 48 ft. long and 11

ft. wide, speed 30 Chinese *li* per hour; the other named *Hung-foo* having a tonnage of 6, drawing 3 ft. 5 in. deep water, with a measurement of 46 feet long and 8 feet wide, speed of 30 *li* per hour. These two vessels are to run from Peng-pu to Jen-yang-kwan via Fai-yuen, Feng-dai, and Zerhsien.

C.M.S.N. Navigates the Changsha-Hankow Line.—A branch office of the China Merchants' Steamship Navigation Co., Shanghai, has been established at Changsha, Hunan, to operate on the Changsha-Hankow run. Service began on April 5, 1921, with three vessels.

Proposed New Shipping Company.—Enthused with the success of the China Mail Steamship Company, which is a purely Chinese concern, and with the object of competing for a portion of the foreign shipping business, a party of Cantonese, it is reported, will soon organize a steamship company with a capital of $4,000,000 to put a number of ships on the service, between Hongkong, Honolulu and San Francisco and to sail to New York, Cuba and Panama. The name of the proposed company is to be the Chung Hwa Steamship Company.

New Far Eastern Lines.—The new 20,000-ton Canadian Pacific liner, *Empress of Canada*, has finished successful speed tests on the Clyde, but her cabins will probably have to be fitted abroad. It is proposed to send out the vessel via the Panama Canal. She will run between Vancouver and Japan, and will be the largest and fastest liner on the Pacific.—*Reuter.*

Osaka Shosen Kaisha: Ten Ships Building.—The Osaka Shosen Kaisha has under construction ten ships at home and abroad with an aggregate gross tonnage of 33,200. Seven steamers are now being built at the Osaka Iron Works and of the above the *Seikyo Maru*, 2,600 tons, will be delivered to the orders next June and the *Nagato Maru*, 2,600 tons, next July. The remaining five ships will be completed by next February. The Company's *Baikal Maru*, 5,000 tons, under construction at the Mitsubishi Shipbuilding Yard, Nagasaki, will be launched August and afterwards will be allotted to the Dairen passenger service to relieve the *Kagi Maru*. *The London Maru*, 7,500 tons, and the *Paris Maru*, also 7,500 tons, are now being built in England, the former to be launched next August and the latter December.

New Service to Korea and China.—A new ship ping service is expected to be inaugurated between Gunsan and Tsingtao as a means of furthering the trade between Korea and China. At present almost the only port in Korea providing facilities for trade with China is Chemulpo, and Japanese business men in Korea now feel the necessity of opening an extra shipping service. With this end in view negotiations have been in progress for some time past between the Gunsan chamber of commerce and the Korea mail steamship company. The proposal is now assuming practical shape, and it is expected that the Gunsan-Tsingtao service will be shortly opened. This service is to be subsequently extended to Dairen and Yingkow.

Y.K.K. Starts Line from Kobe to Siam.—Yamashita Kisen Kaisha has been noticeably active in opening new shipping lines. It has recently increased regular sailings on the Yokohama-Korea run to five a month, vessels used for this purpose being the *Uwajima Maru XI*, the *Shinyei Maru*, the *Kishiwada Maru* and several other extra steamers. Another new service between Yokohama and Kobe is designed to compete with railway transport charges, which were raised some time ago.

In addition to the Formosa-South China service, which is subsidized by the government of Formosa, the company has opened a through service between Kobe, Saigon and Bangkok. This is the first Japanese service to be opened in that part of the world. On the outward voyage vessels will carry general cargo for the most part, while the principal cargo for the return voyage will be rice.

In the seas further afield, the Yamashita Kisen Kaisha has placed the *Yoshida Maru*, 8,769 tons, between North America, Australia and Japan. Besides, the company contemplates inaugurating a service from North America to South America.

The several small ships which were recently chartered by the company are expected to be used on its new coasting and near-sea lines.

New P. & O. Boat.—The British India Steam Navigation Company's steamer *Manela* started on her maiden voyage as a Peninsular and Oriental Line steamer recently, sailed from London with passengers and cargo to the Straits Settlements, China and Japan.

The *Manela* belongs to the group of twelve 8,000-ton ships of a similar type, built for the Bombay-London trade.—*Reuter.*

Sino-Belgian Steamship Company.—It is reported that for the purpose of getting funds for the formation of the proposed Sino-Belgian Steamship Company, the government is contemplating the sale of the German and Austrian steamers to certain Belgian interests. The proceeds of the sale will be partially used for meeting the financial requirements of the central government and partially be subscribed as Chinese share to the proposed Sino-Belgian Steamship Company for the promotion of Sino-Belgian commerce and industry.

A New Steam Ferry Launch Co., Pootung.—The Pootung Steam Ferry Launch Co., Ltd. is being established by Mr. Doong Sze-heng, a Shanghai merchant, with a capital of $100,000. It will run a regular ferry service in the Whangpoo River with six steam launches and eight towboats. Application for the approval and registration of the proposed company has been made with the local authorities.

A Sino-Franco Steamship Co. Established Shanghai.—A Sino-Franco steamship company has been established by Chinese and French leading merchants at Shanghai with a capital of Tls. 300,000. The first ship sailing under the flag of this new company is the s.s. *Kiang Chin* having a capacity of 500 tons and will sail between Chungking and Ichang.

Vessels Built at Shanghai for Chinese Owners.—The steam-launches *Chunhsin* (89.67 tons register), for Chun Hsin Steam-launch Company; *Chuheng* (53.48 tons, for Ta Ta & Co.; *Chianghua* (4.57 tons), for Hsieh Chi & Co.; *Chenhuai* (47.78 tons), for Li Chi & Co.; *Fengho* (13.89 tons), for Feng Tai & Co.; *Hengtahsing* (4.01 tons), for Heng Ta Cotton Mill; *Hsinlichiang* (5.57 tons), for Chen Chi & Co.; *Hsinsookun* (5.50 tons), for Lau Chien Kung Chi; *Hsinshengho* (37.72 tons), for Hsu Ching Yung; *Tungsen* (15.02 tons), for Sheng Tai Hsing; *Yuanhsiang* (12.44 tons), for Yuan Tung & Co.; *Yuanchi* (19.68 tons), for Yuan Tung & Co.; the motor-launches *Hsinyuan* (4.20 tons), for Yi Hsin Ironworks; *Ningping* (5.06 tons), for Ning-Shao Inland Steam-launch Company; *Ningan* (5.06 tons), for Ning-Shao Inland Steam-launch Company; *Wukong* (4.73 tons), for Shanghai-Hangchow-Ningpo Railway Company.

Tientsin People Organize Steamship Co.—It is stated that Tientsin residents interested have organized a steamship company for the purpose of opening a steamer service between the local port, Lungkow, Dairen, Chefoo and Chinwangtao.

Japan Building Only Few Merchant Ships.—The construction of merchantmen in this country shows a great falling off. According to the investigations of the department of communications, only two vessels of not less than 1,000 tons gross were launched during June. They are the *Changsha Maru*, 2,600 tons gross, built by the Osaka Ironworks for the Osaka Shosen Kaisha, and the *Wales Maru*, 6,500 tons gross, of the Kawasaki Dockyard. While only these two ships, totalling 9,100 tons gross were launched during last month, 10 ships, totalling 42,470 tons gross, were launched in the corresponding month of last year.

Between January and June last, vessels launched of not less than 1,000 tons gross each number 27, totalling 144,250 tons gross, as against 60 ships, totalling 283,855 tons gross in the same period of 1920. It will be seen that the output of commercial tonnage has decreased by nearly half since last year. Prospects for the remainder of the year are even worse. It is expected that only one ship will be launched during July, while there will be no ship launched in August and September, excepting ships of less than 1,000 tons gross.

New Japanese Shipping Combine Proposed.—A new Japanese shipping combine has been proposed. When an amalgamation of all the shipping companies was proposed some time ago most of the smaller companies favored the idea, but the larger companies, while agreeing in principle, were not willing to merge their interests with weaker concerns. Under the proposed arrangement the various subsidized companies would give up their ships and titles to the holding company, while the other assets would be divided among those who now hold shares. Certain other companies would merely offer their vessels. The promoters are hoping to control about two and a half million tons dead weight of shipping and to capitalize the merger at about half a billion yen. As shares of the different shipping companies have a very wide range in value the shares in the new company would have to be apportioned according to the holdings in the separate concerns. The value of the shares in the new company which the present shareholders of the Nippon Yusen Kaisha would receive would be based on an estimate of Y.75,126,000, as covering the value of ships now held, ships not yet completed, business premises, and the right to operate the Nippon Yusen Kaisha lines. The value of other assets which the Nippon Yusen Kaisha would not turn over to the amalgamated company would come to about Y.150,000,000, which amount would be distributed among the present shareholders according to the amount of stock which they hold.

A New Shipping Co.—Mr. Fu Siao-en and several other Chinese and French gentlemen were elected directors of the newly formed Sino-French Steamship Co., at a meeting held recently at No. 6 The Bund. The capital of the new company is $300,000. A steamer has already been purchased and will run between Ichang and Chungking. Mr. Tang Yu-kan has been appointed compradore.

TELEPHONES AND TELEGRAPHS

Communication Between Tokyo and Mogi.—A telephone line will be laid from Tokyo to Mogi.

America Plans to Lay Shortest Cable to Far East.—Investigations are proceeding for the purpose of laying the shortest cable between America and the Far East. The cable will start from Seattle, and by way of Alaska and Aleutian Islands, reach Kamchatka and Kurile Island, whence to proceed to Vladivostok. The proposed line will reduce the present route by over 2,000 miles.

Chongchow-Shihkachuang Telegraph Line.—The ministry of communications will build a telegraph line along the new Chongchow-Shihkachuang automobile road.

New Telephone Office, Sha-Tze, Hupeh.—The building of the sub-telephone office at Sha-tze, Hupeh was formally opened on May 15, 1921, with many new subscribers.

TRAMWAYS

A Prospective Tramline.—The ministry of communications has been asked to sanction a tramway service to be constructed from North Szechuen Road extension to Chengju, Nanzing and Woosung. Messrs. C. C. Nieh, Wu Ting-sung, and Sun Lien-fang are said to be principals in the concern, which is to have a capital of $1,500,000.

Shanghai-Paoshan Tramway.—As previously reported, the plan for the building of the Shanghai-

Paoshan tramway is maturing. It has since been learned that the corporation to undertake this enterprise will be capitalized at $1,500,000 and permission to hold the right of monopoly for a period of 50 years is requested by the promoters, Mr. Wu Tin-sun and Mr. C. C. Nieh, leading merchants of Shanghai.

A High-Speed Tramway for Holiday Makers.—The new high-speed tramway was opened at the beginning of July, connecting Osiage, Honjo Ward, and Tsudanuma, Chiba prefecture. In the neighborhood of Tsudanuma, a recreation ground, covering about 300,000 *tsubo*, will shortly be laid out for the benefit of Tokyo and Chiba holiday makers. The new tramway line will run the distance in less than 25 minutes.

New Line Between Tokyo and Nikko.—Work is progressing with the construction of this line, land having been purchased. Eleven stations will be built in Saitama prefecture.

Tramways, Hunan.—The construction of an electric tramways system from Siangtan to Changsha, China, a distance of about thirty miles, is being considered. The scheme includes the acquisition of fifteen tram-cars.

Tramways to be Built in Chapei.—After consultation with the gentry and prominent merchants concerned, the Shanghai Chinese Tramway Co. has decided to build tramways in Chapei, and two lines have been fixed :

(1) From Sinza bridge along the Soochow Creek to Tso-da-kow passing through San-pei-chen bridge, about 6 *li* in distance.

(2) From Shanghai-Nanking railway station eastward to Kiangwan, about 7 *li* in distance.

It is understood that surveys on the abovementioned lines are being made.

New Japanese Electric Lines.—A company has been formed for the construction and operation of a new electric line from Tokyo to Yokohama, running approximately 1½ miles inland from the present railroad. The Musashi Electric Tramway Co., as the newly organized firm is called, will also furnish electricity to the villages *en route*, states the *Japan Advertiser*.

A translation from Nagoya Shimbun reports that plans are being made for the construction of a railroad 61 miles long between Nagoya and Yamada for the accommodation of visitors to the Great Shrines of Ise. Power is to be supplied by the Ibugawa Electric Power Co. Another line, 30 miles long, around the Chita Peninsula, is planned by a company to be capitalized at Y.4,000,000 to Y.5,000,000. Another translation, from the *Osaka Mainichi Shimbun*, reports a project for the construction of an electric railway between Nagoya and Gifu, as the traffic between these two places is very heavy. It is proposed to construct a double-track line paralleling the present steam railway at an estimated cost of Y.7,000,000. A line between Gifu and Ogaki is also planned.

Chinese Tramway Co., Shanghai.—The total revenue of this company, during 1920 showed an increase of $14,000 over that of 1919, the number of passengers increasing by more than 1,296,000.

The company will double track the important sections of its lines, viz., from Son Wen Men to West Gate and from Sih Kar Pang to Kiangnan Arsenal.

Double Tracks on Shanghai Chinese Tramways.—Work on doubling the tramway tracks on the lines from Lao-so-men to San-wen-men and from the East Gate to the South Gate of the Chinese city, Shanghai been commenced by the Shanghai Chinese Tramway Co. for the improvement of the tramway facilities of the Chinese city. The work is expected to be completed before September 16th, 1921, the Chinese mid-autumn festival.

WATERWORKS

Waterworks, Chapei.—It is proposed by Mr. Wong Chien-shan, chief of the technical department of the Chinese electric light and water supply plant, Chapei, that 16-in. diameter water pipes be installed from Yung Shun Road to Kung Shun Road. The work will commence immediately after the proposal receives approval from the Kiangsu provincial assembly. Upon the request of the fire department, more hydrants will be installed in the Chapei district.

WIRELESS

Wireless Telephones in North Fukien.—The governor of Fukien province is very anxious to establish wireless telephone connection between the leading cities of the province, writes Consul Hanson, from Foochow. The governor has been so interested in the matter that he recently offered to defray the expense of a demonstration at Foochow. Firms interested in the sale of wireless telephone outfits can either address the governor direct, in English, or can send communications to the consulate at Foochow to be transmitted to him.

Japanese at Tsingtao Building Two New Wireless Towers.—The Japanese authorities at Tsingtao have completed the construction of two wireless towers and are now awaiting the arrival of the necessary electrical equipment from Japan before opening the new wireless plant. The two towers have been constructed from material captured from the Germans in 1914, and the plant will, when fully equipped, be powerful enough to communicate with any wireless station in Japan.

Tsingtao Japanese maintain that the new plant will be operated for strictly commercial purposes, but the secrecy that is being maintained about it and the fact that no one is allowed to go within a hundred yards of the towers inclines the foreign residents of Tsingtao to the belief that the new wireless station is designed to replace the naval wireless station that was dismantled a few weeks ago. This latter station was, it is generally stated in Tsingtao, given up by the Japanese because it could not be made to function properly.

Improvements in Philippines Wireless Telegraphy.—Recent improvements in the naval wireless telegraph station at Cavite now enable the transmission of radio messages from the Philippines to San Francisco without relay. A large increase in electrical power and the construction of telegraph lines between Cavite and Los Banos are responsible for this direct Pacific wireless service covering some 7,000 miles. Formerly despatches from the islands to points in the United States were copied at Honolulu and relayed to the mainland. This meant unnecessary delay in transmission. The improvements will treble the capacity of the naval radio service to and from the Philippines. The naval radio stations at Cavite and Los Banos are handling a daily total of approximately 12,000 words. The service covers all of the Navy and Army business, some of the insular government's messages, the Associated Press despatches amounting to 1,000 words a day, aside from other press matter, and a considerable volume of commercial business, according to a statement in the bulletin of the Philippine government commercial agency in New York.—*Commerce Reports*.

ELECTRICITY *

New Electric Power House, Fushun.—The new electric power house on an up-to-date pattern, which is to be the third power house at Fushun collieries will be completed during August and will be opened to operation by October next.

This power house is to use dust coal for fuel. The chimney of the new power house will be taller than the tallest at Dairen, being 260-ft. high, measuring some thirty feet in diameter on the top.

New Electric Companies.—Huang Kya-lin and others have organized the Yau Tai Electric Light Company at Tai Hsin, in Kiangsu province.

The ministry of communications has granted the Sing Yang Electric Light Company of Sing Yang, Honan, its registration.

The Ojoko Dengyo Co. was organized recently to manufacture electrical apparatus. Office : 4 Itchome, Yuraku-cho, Kajiwachi-ku, Tokyo. Manager : Mr. R. Taya.

The Tasoda Electric Bulb Manufacturing Co., 92 Minami Shinagawa-cho, Tokyo-fu. Manager : Mr. G. Terada. Established recently.

INDUSTRIAL †

New Paper Mill.—According to the *Shanghai Nippo* (Japanese), Sino-Japanese capitalists will establish a paper mill in Kirin with a capital of $5,000,000. It is reported that the ministry of agriculture and commerce has given its approval.

The Katsura Iron Works was organized recently to manufacture general machinery adn machine tools. Office at 193 Minami Uagai, Toyosaki-cho, Nishimari, Osaka. Manager : Mr. T. Imanaka.

Paper Mill Amalgamation.—The Oji paper mill will amalgamate with the Karafuto Production Company and the Chosen Paper Mill Company in Korea. The capital of the new company is Y.51,000,000.

Manufacturers of Machinery.—The Tsitsumi Machine Manufacturing Co. was organized recently to manufacture machinery. Office : 73 Hondasanban-cho, Nishi-ku, Osaka. Manager : Mr. S. Tsutsumi.

The Asia Tobacco Co., Ltd., whose head office is in Tsingtau, will build a factory at Mukden under the direction of Mr. Inumaru at a cost of Y.10,000,000.

To Manufacture Wrapping Paper.—The Tokyo Wrapping Paper Company, Ltd. was organized recently with a capital of Y.55,000. Office : 765 Yanaka, Nippori, Tokyo-fu. Manager : Mr. S. Yanagi.

The Kaweda Soap Manufacturing Co. was organized recently to manufacture soap. Office : 939 Nippori Mashi, Tokyo-fu. Manager : Mr. S. Kaneda.

Machinery Exhibition at Osaka City.—An engineering and machinery exhibition will take place in Osaka in October for the purpose in promoting interest in general motors, machines and tools.

Paper Mill in China.—The Okura gumi proposes to commence business with a capital of Y.5,000,000 by building a paper mill at Kitsurin, China. Necessary official permission has been obtained.

The Ishibashi Iron Works has been established to manufacture printing machines. Office at 4464 Itchome, Nihonbashi-suji, Minamoku, Osaka. Manager : Mr. K. Kawaguchi.

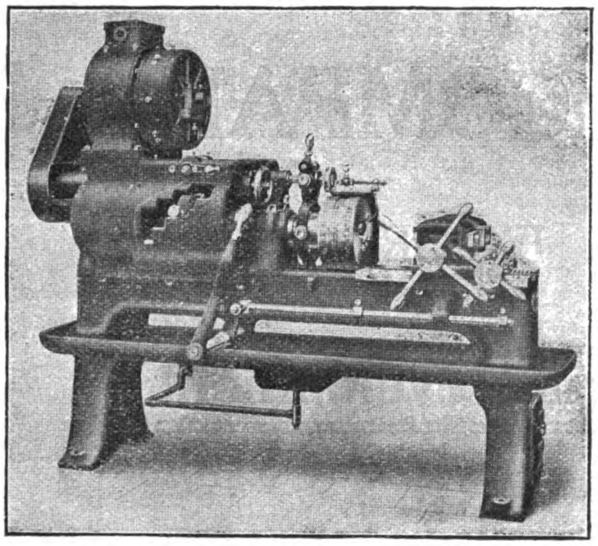
The Colonial Industry Company was organized recently at 1828 Kameyedo, Tokyo-fu, to engage in general construction contracting. Manager : Mr. S. Suzuki. Branch office at Karafuto.

The Settsu Iron Works was organized recently to manufacture general machinery. Office : 83 Ichioka-machi, Nishi-ku, Osaka. Manager : Mr. M. Tomari.

The Taichi Industrial Co., Ltd. was organized recently with a capital of Y.250,000, fully paid up, to do a business in road construction materials. Office : 26 Sanchome Minami Yedobori, Nishi-ku, Osaka. Managing Director : Mr. D. Osawa.

* † Continued from page 569.

Heap's Automatic Screwing Machines



Arranged for Direct Motor Drive.

These machines are made in all sizes with Single and Double Heads.

When desired they can be fitted with an All-Gear Head instead of the usual Cone Pulley. The drive can then be by Electric Motor as illustrated, or by Constant Speed Belt.

All these machines are fitted with our Patent Steel Head, which is the most simple and only mechanical Die-head on the market. Springs, with their attendant troubles or other delicate mechanisms, which can get clogged with dirt and the swarf inseparable from a Screwing Machine, do not enter into its construction in any way.

The Die-head opens automatically and the return motion of the carriage closes it ready for the next piece. There are no other levers to set.

If you have threading work to deal with send us particulars and we will offer you a suitable machine.

Copy of Catalogue will be posted free on request to all responsible firms.

JOSHUA HEAP & CO., LTD.,

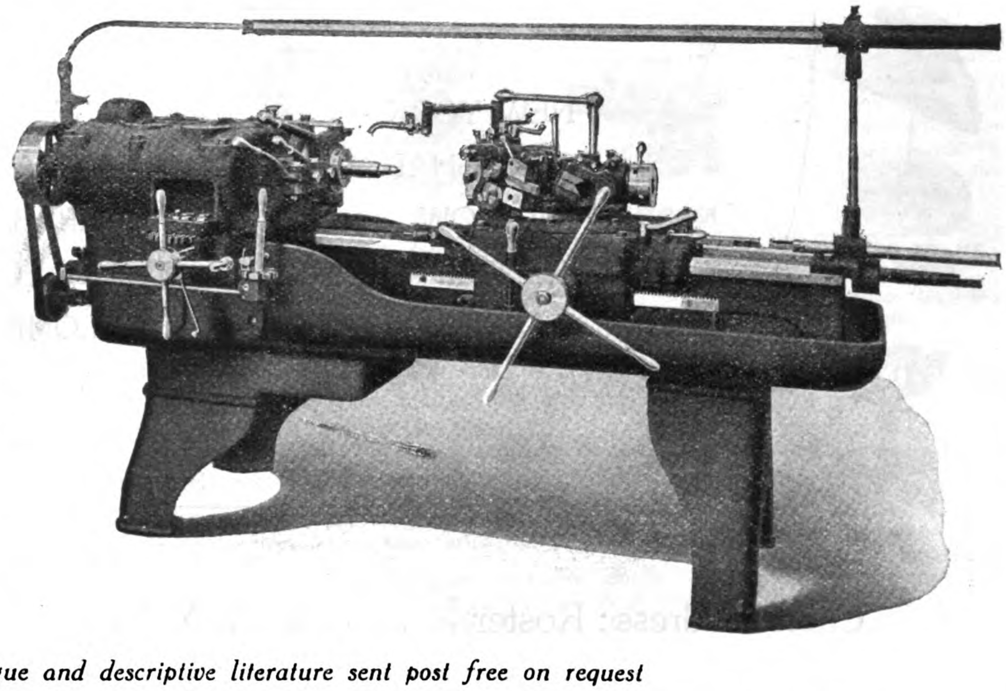
ASHTON-UNDER-LYNE, ENGLAND.

TWELVE THOUSAND FIVE HUNDRED OF THEM

On January 2nd, 1891, the FIRST HARTNESS FLAT TURRET LATHE was sold of the Buffalo Forge Co. of Buffalo, N.Y.

Since that time we have built and sold over TWELVE THOUSAND FIVE HUNDRED FLAT TURRET LATHES, including the original design, the later Cross-sliding Head machine, and the latest Double Spindle Flat Turret Lathe.

THE FLAT TURRET LATHE WAS THE ORIGINAL MACHINE IN ITS FIELD. There are now several machines of more or less similar design intended for the same class of work. "We welcome this competition, since it gives us an increased opportunity for demonstrating the fundamental excellence of our machines in design, construction, and output."



Catalogue and descriptive literature sent post free on request

JONES & LAMSON MACHINE COMPANY

9-10 Water Lane, Queen Victoria Street, London, E.C., England.
Cable Address · "Turretorum" London.

Springfield, Vermont, U.S.A.
Cable Address: "Turret" Springfield, Vt.

THE KOSTER COMPANY

IMPORT EXPORT

American and Foreign Development

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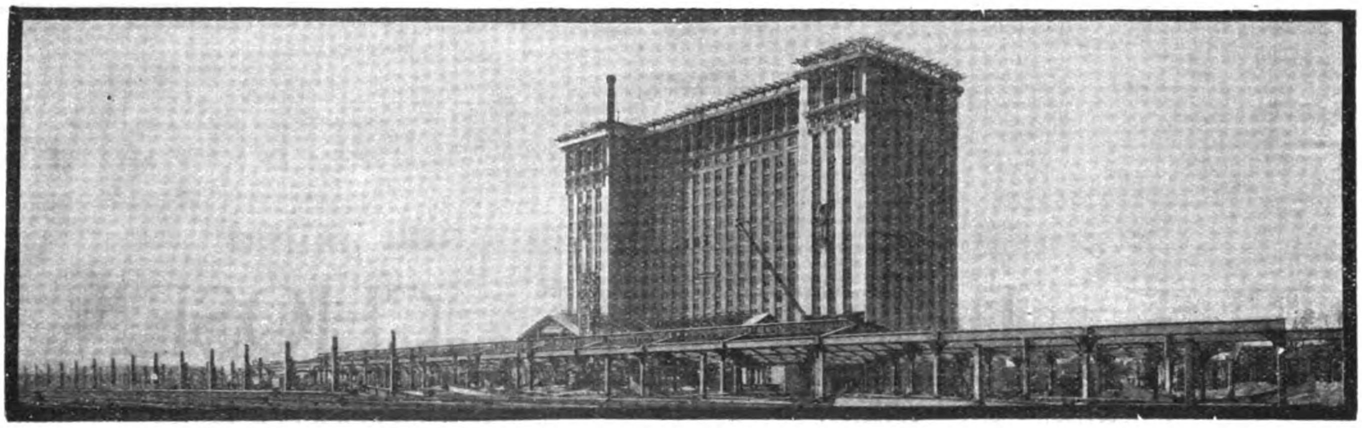
BRANCHES:

NEW YORK	KOBE
SHANGHAI	MANILA
HANKOW	SOERABAYA
TIENTSIN	SINGAPORE
HARBIN	COLOMBO

Cable Address: Koster All Codes Used



Michigan Central Depot and Office Building, Detroit, Mich., U.S.A.

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Manufacture and Erect
Steel Industrial Plants
Railroad and Highway Bridges
Lock Gates
Blast Furnace Plants
Steel Storage Tanks
Riveted Steel Pipe
Steel Transmission Towers
Steel Ships and Barges
Oil Refining Plants
Gas Plants and Gas Holders
Ore Bridges
Etc.
McClintic-Marshall
Annual Capacity, 400,000 Tons

At the Terminals of the Road

THE terminals of a railroad are of the utmost importance. They reflect the character, foresight and efficiency of the management. An imposing structure, like the Michigan Central Depot, at Detroit, U. S. A., is a tribute to individuality, progressiveness and transportation vision.

The notable success of the McClintic-Marshall Products Company in constructing steel structures for terminals is industrial history.

McClintic-Marshall Products Company

WORKS: PITTSBURGH, U. S. A.

Foreign Contract Dept., 50 Church Street, NEW YORK

Cable Address: "Macmarsh" NEW YORK

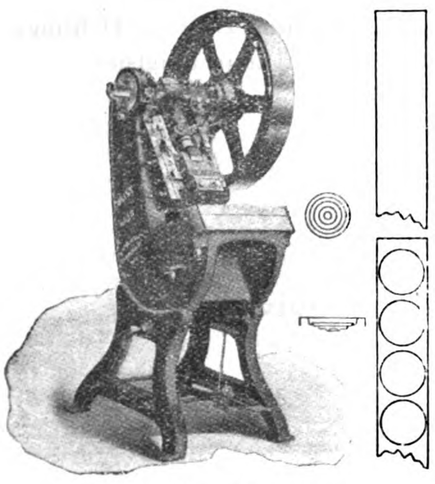
PARIS, *Robert McKean*, 8, Rue Edouard VII. HAVANA, Obrapio y Ignacio
Madrid, Hispano-American Corporation

McClintic-Marshall

Steel Construction

FROM THE TIN PLATE TO THE FINISHED CAN

THE PRESS



No. 20—"Bliss" Power Press

SHEAR
This cuts the tin plate into strips.

PRESS
This blanks out tops and bottoms.

ROLL FORMER
This rolls the bodies to cylindrical shape.

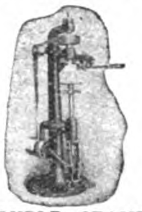
SOLDERING FRAME and CYLINDER
This solders the side seams.

After shearing out the strips (see last advertisement) the next process is to stamp out the bottoms and tops of the cans from these strips (machine and operation shown at left). This is done by the celebrated "BLISS" PRESS, operating combination dies which are made up to suit customers' requirements.

Do not overlook this series of advertisements and, especially, watch for the next one illustrating the third operation.

"Bliss" Can Making Machinery (one series shown at right) is suitable for making cans of all kinds, and tin packages for every purpose. **With your inquiries always send samples and state daily output desired.**

FLANGER
This flanges both ends of can bodies.



DOUBLE SEAMER
This attaches bottoms and tops.

E. W. BLISS COMPANY

22 JOHN ST., BROOKLYN, N.Y., U.S.A.

Presses, Dies and Machinery for the Sheet Metal Industry in general. Complete plants for the manufacture of Metal Boxes, Sanitary Cans of all shapes and sizes, Kitchen Utensils, Petroleum Cans, etc. Complete automatic equipment for making tin cans from tin plate in one continuous operation.

London, England—Pocock St., Blackfriars Road **Paris, France—100 Boulevard Victor Hugo, St. Ouen**

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Capital Paid-up - - - Yen 50,000,000

Governor : S. Minobe, Esq.
Deputy-Governor : T. Kano, Esq.

Directors :

S. Ohta, Esq. S. Katayama, Esq.
S. Yoshida, Esq. S. Kakei, Esq.

Head Office: SEOUL (Chosen)

FOREIGN DEPARTMENT : TOKYO

(All communications relating to correspondence arrangements and the Bank's general foreign business to be addressed to the Foreign Department)

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Korea—Chemulpo, Pyengyang, Fusan, Wonsan, Taiku, Chinnampo, Kunsan, Mokpo, Hoilyong, Chongjin
Manchuria—Antung, Fengtien (Mukden), Dairen, Yingkow (Newchwang), Changchun, Harbin, Tiehling, Liaoyang, Ryojun, Kaiyuan, Chengchiatun, Szupingchieh, Fuchiatien, Kirin, Lungchingtsun
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Siberia—Vladivostock, Alexandrofsky Post

NEW YORK AGENCY :

The City Investing Building, 165 Broadway, New York City

LONDON REPRESENTATIVE :

Gresham House, 24 Old Broad Street, London, E. C. 2

Correspondents:

San Francisco, Seattle, New York, London, Paris and in other commercial centers throughout the world

International Banking Corporation

CAPITAL, SURPLUS AND UNDIVIDED PROFITS: G. $14,000,000

OWNED BY THE NATIONAL CITY BANK OF NEW YORK

HEAD OFFICE: 60 WALL STREET, NEW YORK

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- PEKING
- SHANGHAI
- TIENTSIN

DOMINICAN REPUBLIC
- BARAHONA
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- SAN FRANCISCO DE MACORIS
- SAN PEDRO DE MACORIS
- SANCHEZ
- SANTIAGO
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INDIA
- BOMBAY
- CALCUTTA
- RANGOON

JAPAN
- KOBE
- YOKOHAMA

JAVA
- BATAVIA
- SOURABAYA

PANAMA
- COLON
- PANAMA

PHILIPPINE ISLANDS
- CEBU
- MANILA

SPAIN
- MADRID
- BARCELONA

STRAITS SETTLEMENTS
- SINGAPORE

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- BUENOS AIRES
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BELGIUM
- ANTWERP
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- PERNAMBUCO
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- RIO DE JANEIRO
- SANTOS
- SAO PAULO

CHILE
- SANTIAGO
- VALPARAISO

COLOMBIA
- BARRANQUILLA
- BOGOTA
- MEDELLIN

CUBA
- HAVANA AND 22 BRANCHES

ITALY
- GENOA

PERU
- LIMA

PORTO RICO
- PONCE
- SAN JUAN

SOUTH AFRICA
- CAPE TOWN

URUGUAY
- MONTEVIDEO

VENEZUELA
- CARACAS

Commercial and Travellers' Letters of Credit, Bills of Exchange and Cable Transfers bought and sold. Current accounts opened and Fixed Deposits in local and foreign currencies taken at rates that may be ascertained on application to the Bank.

N. S. MARSHALL, *Manager.*

1A KIUKIANG ROAD.

BANQUE DE L'INDO-CHINE.

Capital	**Frs. 72,000,000**
Reserves	**„ 70,000,000**

HEAD OFFICE: 15 BIS RUE LAFFITTE, PARIS.

Succursales et Agencies:

Bangkok	Haiphong	Mongtze	Pnom-Penh	Singapore
Battambang	Hankéou	Nouméa	Pondichery	Tientsin
Canton	Hanoi	Papeete	Saigon	Tourane
Djibouti	Hongkong	Peking	Shanghai	

Bankers:

IN FRANCE: Comptoir National d'Escompte de Paris, Credit Lyonnais; Banque de Paris et des Pays-Bas; Crédit Industriel et Commercial Société Générale.

IN LONDON: The National Provincial and Union Bank of England, Ltd.; Comptoir National d'Escompte de Paris; Crédit Lyonnais.

The Shanghai Agency undertakes all banking operations and exchange business; grants credits on goods and approved securities and receives deposits on current and fixed deposits according to arrangement.

L. ARDAIN, *Manager.*

The First National Bank of Boston

Transacts commercial banking business of every nature

Correspondence Solicited

Capital, Surplus and Profits

$37,500,000

THE ROYAL BANK OF CANADA

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LONDON, ENG. PRINCES ST., E.C.

NEW YORK. 68, WILLIAM ST.

PARIS, FRANCE. THE ROYAL BANK OF CANADA (FRANCE)

BARCELONA. PLAZA DE CATALUNA 6

715 BRANCHES.

617 Branches in Canada and Newfoundland, also

98 FOREIGN BRANCHES.

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COLOMBIA Barranquilla.

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PORTO RICO—San Juan, Mayaguez and Ponce. **HAITI**—Port-au-Prince.

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BRITISH GUIANA—Georgetown, New Amsterdam, &c.

BRITISH HONDURAS—Belize.

CAPITAL PAID UP & RESERVES $40.000.000

TOTAL RESOURCES OVER - - $600.000.000

THE BANK OF TAIWAN LTD.

INCORPORATED BY SPECIAL IMPERIAL CHARTER, 1899

Capital Subscribed - - - - - -	Yen 60,000,000
Capital Paid-up - - - - - - -	,, 45,000,000
Reserve Funds - - - - - - -	,, 9,680,000

President: **KOJURO NAKAGAWA, Esq.** Vice-President: **SHUNROKURO MORI, Esq.**

DIRECTORS:

TSUNEKICHI IKEDA, Esq.
GUNJI KAWASAKI, Esq.
TADASU HISAMUNE, Esq.
KUMEMATSU MORINAGA, Esq.
MASUMI ESAKI, Esq.

Head Office: **TAIPEH, FORMOSA (TAIWAN)**

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TAIWAN: Keelung, Tainan, Takow, and 11 other points.
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OTHERS: Bangkok, Batavia, Bombay, Hongkong, London, New York, Semarang, Singapore, Soerabaya.

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Telegraphic Address: "TAIWANGINK."

Phone Nos. 1060, 1061, 1062, 1063, 1064, 1065, 1066, 446, 447, 448 and 449, Marunouchi.

Interest allowed on Fixed Deposits, and Current Accounts on terms which may be ascertained on application. Most favourable terms are granted for Petty Current Accounts.

Every description of Exchange and General Banking business transacted.

Special facilities are available for exchange business on China, Straits Settlements, East Indies, Australia, Great Britain, Russia, America, Canada, South Africa, etc.

Banque Industrielle de Chine

CAPITAL AUTHORIZED - - - - - - -	Frs. 250,000,000
CAPITAL SUBSCRIBED - - - - - - -	„ 150,000,000
CAPITAL PAID-UP - - - - - - - -	„ 75,000,000
RESERVES - - - - - - - - - -	„ 40,000,000

One-third of the Capital, i.e., Francs 50,000,000, subscribed by

THE GOVERNMENT OF THE CHINESE REPUBLIC

Statutes approved by the Government of the Chinese Republic on the 11th January, 1913.

President: ANDRE BERTHELOT

General Manager: A. J. PERNOTTE

HEAD OFFICE: 74 RUE SAINT LAZARE, PARIS.

Branches:

ANTWERP	HANKOW	MUKDEN	SINGAPORE
BATAVIA	HANOI	NEW YORK	SWATOW
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DUNQUERQUE	LONDON	ROTTERDAM	VLADIVOSTOCK
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BANKERS:

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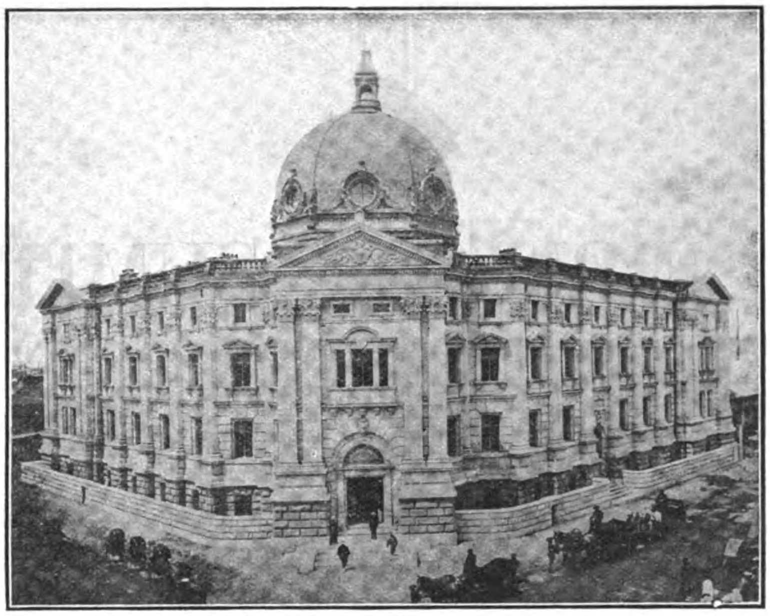
Interest allowed on current accounts in Gold or local currency.
Savings account and fixed deposits. Terms on application.
Every description of Banking and Exchange business transacted.

B. ADAM, *Manager*.

1 French Bund, Shanghai.



HEAD OFFICE, YOKOHAMA

Capital (Fully Paid-Up):
Yen 100,000,000

Reserve Fund:
Yen 53,000,000

CORRESPONDENTS AT ALL THE CHIEF COMMERCIAL CITIES IN THE WORLD

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Established 1880

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Head Office: YOKOHAMA
Manager: H. MORI, Esq.

TOKYO BRANCH
No. 1, Itchome, Eirakucho, Kojimachi-ku.
Manager: K. MOGAMI, Esq.

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Bombay	Fengtien	Honolulu	Lyons	Newchwang	Rio de Janeiro	Shimonoseki	Tsingtau
Buenos Aires	Hamburg	Kaiyuang	Manila	New York	Saigon	Singapore	Tsinan
Calcutta	Hankow	Kobe	Nagasaki	Osaka	San Francisco	Sydney	Vladivostock
Changchun	Harbin	London		Peking	Seattle	Sourabaya	

LONDON BANKERS

LLOYD'S BANK, LIMITED
LONDON COUNTY WESTMINSTER AND PARR'S BANK, LIMITED
NATIONAL PROVINCIAL AND UNION BANK OF ENGLAND, LIMITED
LONDON JOINT CITY AND MIDLAND BANK, LIMITED

Interest allowed on Current Accounts and Fixed Deposits on terms to be ascertained on application.
Every description of Banking business transacted.
For particulars, apply to the managers.

THE FIRM OF SUMITOMO

OWNERS OF BESSHI COPPER MINE, COAL MINE, ETC.

MANUFACTURERS OF

Tubes, Plates, Sheets and Bars of Copper Brass, Bronze and other Copper Alloys, Solid Drawn Steel Tubes, Nails, Electric Wires and Cables, Artificial Fertilizer, etc.

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General Head Office	Osaka	Tokyo Sales Department	Tokyo
Besshi Copper Mine Office	Niihama, Iyo	Kure Sales Department	Kure near Hiroshima
Copper Sales Department	Osaka & Kobe	Yokosuka Sales Department	Yokosuka
Warehouses	Osaka, Kobe & Toyko	Hakata Sales Department	Hakata
Wakamatsu Coal Department	Wakamatsu, Chikuzen	The Sumitomo Yoko	Shanghai
Copper Works	Osaka & Amagasaki	The Sumitomo Yoko	Hankow
Electric Wire and Cable Works	Osaka	The Sumitomo Yoko	Tientsin
Fertilizer Manufactory	Niihama, Iyo	The Sumitomo Bank of Hawaii	Honolulu
Sapporo Mine Office	Sapporo, Hokkaido	The Sumitomo Bank of Seattle	Seattle

THE SUMITOMO STEEL WORKS, LIMITED

OSAKA, JAPAN

President: Baron K. SUMITOMO

MANUFACTURERS OF

Steel Ingots, Steel Forgings, Steel and Iron Castings of every description for Railways, Shipbuilding Yards, Mines, Hydraulic, Electric and other Engineering Works, etc. etc.

THE SUMITOMO BANK, LIMITED

OSAKA, JAPAN

Cable Address: "SUMITBANK"

President: Baron K. SUMITOMO

Capital Subscribed	**Yen 70,000,000**	**Reserve Fund**	**Yen 12,000,000**
Capital Paid-up	**" 40,000,000**	**Deposits (30th June, 1920)**	**" 360,000,000**

HOME BRANCHES:

Tokyo, Yokohama, Nagoya, Kyoto, Kobe, Hyogo, Onomichi, Niihama, Kure, Hiroshima, Yanai, Shimonoseki, Moji, Kokura, Wakamatsu, Hakata, Kurume.

FOREIGN OFFICES:

New York, San Francisco, Shanghai, Hankow, Bombay, London, Seattle (Affiliated Bank), Hawaii (Affiliated Bank).

AGENTS:

National City Bank of New York, New York. Lloyd's Bank Ltd., London.

The Bank buys, sells and receive for collection Drafts and Telegraphic Transfers, issues Commercial and Travellers Letters of Credit available in all important parts of the world, besides doing general Banking business.

THE

MITSUBISHI BANK,

LIMITED

CAPITAL SUBSCRIBED - Yen 50,000,000
CAPITAL PAID-UP - - - Yen 30,000,000

PRESIDENT:

Baron Koyata Iwasaki

MANAGING DIRECTORS:

Mr. Manzo Kushida Mr. Mikitaro Kikuchi
Mr. Kiyoshi Sejimo Mr. Takeo Kato

HEAD OFFICE:

No. 1 Yayesucho Itchome, Kojimachi-ku,
Tokyo, Japan.

BRANCH OFFICES:

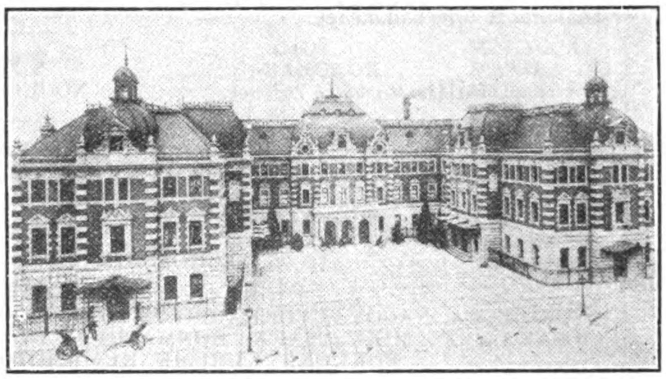
Fukagawa (Tokyo), Marunouchi (Tokyo), Nihombashi (Tokyo), Osaka, Nakanoshima (Osaka), Kobe, Kyoto, Nagoya, Shanghai, New York and London.

General Banking and Exchange Business

Agents for Hongkong and Shanghai Banking Corporation

THE MITSUI BANK, LTD.

The Oldest Bank in Japan, Founded in 1680



Capital Subscribed... ....Y. 100,000,000.00
Capital Paid-Up......................Y. 60,000,000.00
Reserve Fund (Jan. 1921)......Y. 27,000,000.00

HEAD OFFICE:

No. 1 Suruga-cho, Nihonbashi-ku,
TOKYO

BOARD OF DIRECTORS:

GENYEMON MITSUI, Esq. (*President*); SEIHIN IKEDA, Esq., UMEKICHI YONEYAMA, Esq., NAOJIRO KIKUMOTO, Esq. and OTOHIKO MAJIMA, Esq. (*Managing Directors.*)

MORINOSUKE MITSUI, Esq., TOMITARO HARA, Esq., KANETARO KISHIMOTO, Esq., HIROKICHI KAMESHIMA, Esq. and KIKUSABURO FUKUI, Esq. (*Directors*).

Branches:

OTARU, FUKAGAWA (Tokyo), HAKOZAKI (Tokyo), YOKOHAMA, NAGOYA, KYOTO, OSAKA, NISHI (Osaka), KAWAGUCHI (Osaka), NAKANOSHIMA (Osaka), KOBE, HIROSHIMA, SHIMONOSEKI, MOJI, WAKAMATSU, FUKUOKA, NAGASAKI, SHANGHAI.

Foreign Agents:

London: Barclays Bank, Ltd.
London Joint City & Midland Bank, Ltd.

New York: The National City Bank of New York.
The Chase National Bank.
Bankers Trust Co.

Paris: Banque de l'Union Parisienne.
Comptoir National d'Escompte de Paris.

Bombay: National Bank of India, Ltd.

THE DAI-ICHI GINKO, LTD.

(FORMERLY THE FIRST NATIONAL BANK)

ESTABLISHED 1873

Subscribed Capital - - -	Yen 50,000,000.00
Paid-Up Capital - - - -	Yen 29,525,000.00
Reserve Fund - - - -	Yen 28,000,000.00

Y. SASAKI, *President*

K. ISHII, *Managing Director.* Y. NOGUCHI, *Managing Director.* S. SUGITA, *Managing Director.*

HEAD OFFICE:

No. 1 KABUTO-CHO, NIHONBASHI-KU, TOKYO.

T. AKASHI, *Manager*

CITY BRANCHES:

ISECHO, SHIN-OSAKACHO, FUKAGAWA, MARUNOUCHI.

HOME BRANCHES:

YOKOHAMA, NAGOYA, YOKKAICHI, KYOTO, NISHIJIN (KYOTO), GOJO (KYOTO), FUSHIMI, OSAKA, NISHIKU (OSAKA), MINAMIKU (OSAKA), HONMACHI (OSAKA), KOBE, HYOGO, HIROSHIMA, SHIMONOSEKI, CHOFU, MOJI, FUKUOKA, KURUME, KUMAMOTO, HAKODATE, OTARU, SAPPORO, MURORAN.

BRANCHES IN COREA:

SEOUL, FUSAN.

LONDON & NEW YORK BANKERS:

London: London County Westminster & Parr's Bank, Ltd.; The London Joint City & Midland Bank, Ltd.; The Yokohama Specie Bank, Ltd.

New York: The National City Bank of New York.; The National Bank of Commerce in New York.; The Yokohama Specie Bank, Ltd.

CORRESPONDENTS:

The Bank, in addition to its own Branches, has numerous Agencies or Correspondents in the principal Cities and Towns at Home and Abroad.

THE EAST ASIA INDUSTRIAL

COMPANY, LIMITED

(TOA KOGYO KABUSHIKI KAISHA)

TOKYO

ESTABLISHED 1909

FINANCIERS AND CONTRACTORS

K. ARAI, Esq., *President*

R. SHIRAIWA, Esq., *Managing Director*

Subscribed Capital	Yen 20,000,000
Paid-up Capital	„ 11,500,000

Branches: SHANGHAI, PEKING, HANKOW.

Hongkong and Shanghai Banking Corporation

Paid-up Capital	...	$15,000,000
Reserve Funds: Sterling	...	£2,500,000
Silver	...	$21,500,000
Reserve Liability of Proprietors	...	$15,500,000

Court of Directors:

G. T. M. EDKINS, Esq.
Chairman

G. M. DODWELL, Esq.
Deputy Chairman

D. G. M. BERNARD, Esq.
A. S. GUBBAY, Esq.
Hon. Mr. P. H. HOLYOAK
A. O. LANG, Esq.
Hon. Mr. E. V. D. PARR
W. L. PATTENDEN, Esq.
J. A. PLUMMER, Esq.
H. P. WHITE, Esq.

Head Office:
HONGKONG

Chief Manager:
HONGKONG . . . Hon. Mr. A. G. STEPHEN

London Bankers:
LONDON COUNTY WESTMINSTER AND PARR'S BANK LTD.

Shanghai Branch: 12 The Bund
Sub-Agency: 9 Broadway

Branches and Agencies:

AMOY, BANGKOK, BATAVIA, BOMBAY, CALCUTTA, CANTON, COLOMBO, FOOCHOW, HANKOW, HARBIN, ILOILO, IPOH, JOHORE, KOBE, KUALA LUMPUR, LONDON, LYONS, MALACCA, MANILA, NAGASAKI, NEW YORK, PEKING, PENANG, RANGOON, SAIGON, S. FRANCISCO, SHANGHAI, SINGAPORE, SOURABAYA, TIENTSIN, TSINGTAO, VLADIVOSTOCK, YOKOHAMA

Interest allowed on Current Accounts and on Fixed Deposits according to arrangement.

Local Bills Discounted. Credits granted on approved Securities and every description of Banking and Exchange business transacted. Drafts granted on London and the chief commercial places in Europe, India, Australia, Africa, China, Japqn and America.

G. H. STITT, *Manager.*

THE JUGO GINKO, Ltd.

(THE FIFTEENTH BANK)

TOKYO, JAPAN

Telegrams: "Jugoginko, Tokio"

Capital Subscribed Y. 100,000,000 Capital Paid-Up Y. 49,750,000 Reserve Funds Y. 17,478,600

President:
HON. IWAO MATSUKATA

Vice-President:
MASAYASU NARUSE, Esq.

Managing-Directors:
YUTSUHA SATO, Esq. KANESATO AIKO, Esq.

Directors:
BARON KOKICHI SONODA
MARQUIS YORIMICHI TOKUGAWA
VISCOUNT YUKIYOSHI AOYAMA
HON. NAGAYUKI ASANO
YOSHITERU SHIMIZU, Esq.
MASAO MATSUKATA, Esq.
KIYOSUMI TANIKAWA, Esq.

Auditors:
MASAKAZU HISANO, Esq.
BARON MICHITOMO IWAKURA
NAOYOSHI YAMAMOTO, Esq.
TAKAJI SEKIGUCHI, Esq.
TAKAYUKI IMAI, Esq.

Head Office Manager: **Kiyosumu Tanikawa, Esq.**

LONDON BANKS AND AGENTS:

LAZARD BROTHERS & CO., LTD. UNION DISCOUNT CO. OF LONDON, LTD.
LONDON COUNTY WESTMINSTER AND PARR'S BANK, LTD.

BANK OF COMMUNICATIONS

(Specially authorised by Presidential Mandates of April 7th, 1914 and October 31st, 1915 making the Bank of Communications a National Bank).

Head Office: Peking

CAPITAL . . Kuping Tls. 10,000,000

President: TSAO JOU LIN

Vice-President: JEN FUNG PAO

Every description of Banking and Exchange business transacted.
Interest allowed on Current Accounts and Fixed Deposits according to arrangement.
Credits granted on approved Securities.
Special Facilities for Transfers to all parts of China.

Branches

CHIHLI PROVINCE.—Peking, Tientsin, Tungchow, Paotingfu, Haitien, Tangshan, Shuntefu, Shengfang.

SHANTUNG PROVINCE.—Tsinanfu, Tsininchow, Chefoo, Techow, Tsaochwang, Lungkow.

HONAN PROVINCE.—Kaifeng, Lohyang, Chengchow, Chiaotso, Chowchiakow, Taokow, Leiho, Hsinhsiang, Changtefu, Hsinyangchow.

SHANSI PROVINCE.—Shihchiachwang, Tatungfu, Fengcheng, Yangkao.

KIANGSU PROVINCE.—Shanghai, Soochow, Wusieh, Chinkiang, Yangchow, Tsing-kiangpu, Pukow, Penpu, Hsuchow.

CHEKIANG PROVINCE.—Hangchow, Ningpo.

HUPEH PROVINCE.—Hankow, Shasi, Ichang.

KIANGSI PROVINCE.—Kiukiang.

HUNAN PROVINCE.—Changsha, Changteh, Yochow, Hengchow, Hsiangtan

SZECHUAN PROVINCE.—Chungking.

ANHWEI PROVINCE.—Wuhu, Anking, Hsuancheng, Panpu

KWANGTUNG PROVINCE.—Canton.

THREE EASTERN PROVINCES.—Yinkow, Fengtien, Changchun, Kirin, Tiehling, Sunchiatai, Liaoyang, Harbin, Chinhsien.

SPECIAL DISTRICTS.—Jehol, Kueihuacheng, Lenghsien, Chihfeng, Hsinsi, Kalgan (Chahar).

ABROAD.—Hongkong, Singapore.

Industrial Bank of Japan, Limited

(NIPPON KOGYO GINKO)

Incorporated by Special Charter in 1902 to Encourage Foreign Investments

CAPITAL SUBSCRIBED - - - - - - Yen 50,000,000
CAPITAL PAID-UP - - - - - - - Yen 45,000,000

HEAD OFFICE:

MARUNOUCHI, TOKYO. CABLES "KOGIN," TOKYO

BRANCHES:

TOKYO: NIHONBASHI
OSAKA: KORAIBASHI
KOBE: NAKAMACHI

H. HIJIKATA, Esq., President
Y. ONO, Esq., Vice-President
K. IYANAGA, Esq., Director
T. IWASA, Esq., Director
KOZO MATSUMOTO, Esq.

AUDITORS:

NAGATANE SOMA, Esq.
KINTARO HATTORI, Esq.
KINICHI KAWAKAMI, Esq.
TAICHI OHBA, Esq.

All descriptions of general banking, exchange, both foreign and domestic, and trust and corporation financial business transacted.

Correspondents in the principal cities at home, and in London, Paris, New York, and San Francisco.

BUSINESS TRANSACTED:

1.—Loans on the security of public bonds of debentures and shares, estates (Zaidan), specified land and buildings.
2.—Subscription and underwriting public bonds or debentures.
3.—Deposits and safe custody of valuables.
4.—Trust company business.
5.—Discounting of bills.
6.—Foreign exchange business.
7.—Other banking business sanctioned by the Minister of State for Finance in accordance with Law of Ordinance.

AMERICA-JAPAN-CHINA TRUST COMPANY, LIMITED

HEAD OFFICE:

6 Nakabashi Izumicho, Kyobashi-ku, Tokyo.

BRANCH OFFICE:

11 Imabashi Nichome, Higashiku, Osaka.

CAPITAL - - Y. 50,000,000.00

Directors:

Michitaka Sugawara, *Chairman*
Seiji Nawa, *Managing Director*
Toyotsune Mikami
Count Kinjiro Hirosawa
Wu Ting Chang
Kenji Imanishi, *Managing Director*
Taiji Arai
Seishichi Iwasaki
Saburosuke Fujisaki
F. N. Shea

Auditors:

Kanzo Matsuo, Standing
Toyohiko Kuki
Motosaburo Kaneko
Takayoshi Kondo

Councillors:

Raizo Kanda
Katsutaro Kamada

Principal Business of this Company as follows:

1. Financing of Domestic and Foreign Enterprises.
2. Underwriting Public Bonds, Debentures and other Securities.
3. Guaranteeing Loans, Debts and Credits.
4. Issuing Letters of Credit and Accepting Bills.
5. Assisting in the Organization of various enterprises and in the financial re-adjustment of Companies.
6. All other kinds of Trust Business.

Smoke! Smoke!! Smoke!!!

The "Tas Hee" & "Szy Hee" brands of cigarettes.

They are not to be surpassed in excellence, selected from the most superior tobaccos, they will be found pleasing smokes by all. Connoisseurs agree that they are not to be excelled for their fragrance

Try them and you will like them.

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give MORE LIGHT, BETTER LIGHT at LESS COST than any vacuum lamp.

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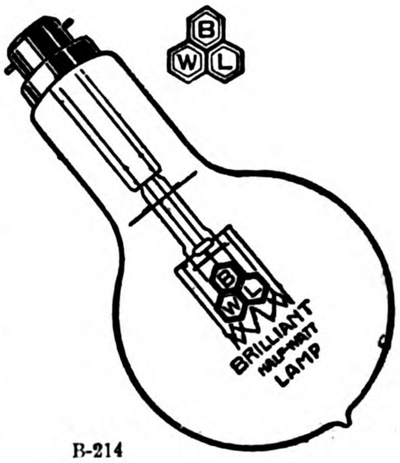
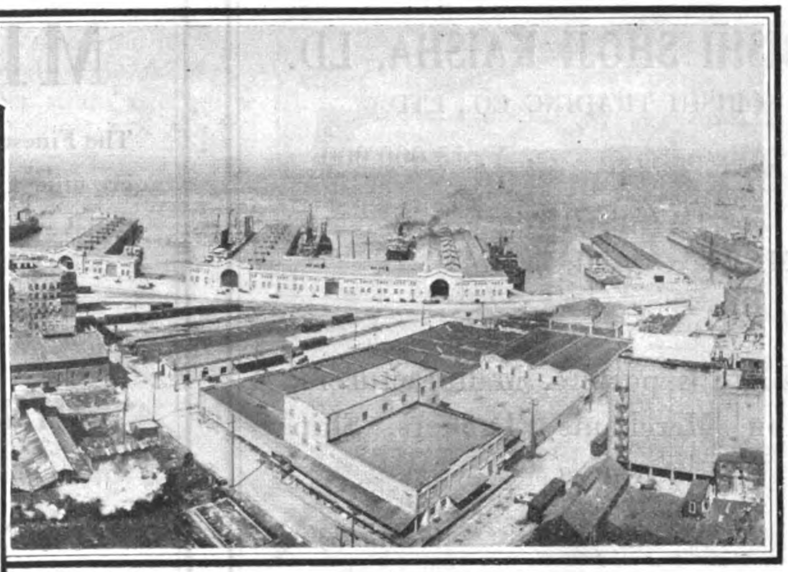


博利安電料公司
上海英大馬路拋球場
電話中央四九〇七

B-214

U.S. DEPOSITORY



HARBOR *of San Francisco*

San Francisco—*The* Gateway *of* American Commerce

The importance of the Port of San Francisco is recognized as the gateway for trade with the Orient.

Located in the heart of San Francisco the Wells Fargo Nevada National Bank is an institution transacting a general banking business—serving the commercial and financial interests of the countries of the East as well as those of the West.

MEMBER FEDERAL RESERVE SYSTEM

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1702-F1

Cable Address:
"IWASAKISAL-
TOKYO"

Code Used:
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Union, Bentley's Complete
Phrase

MITSUBISHI SHOJI KAISHA, LD.

(MITSUBISHI TRADING CO., LTD.)

Capital, fully paid-up - - - Y. 15,000,000

***Head Office*:**

MARUNOUCHI, TOKYO.

Importers and Exporters, Manufacturers, Commission Merchants, Brokers, Ship Owners.

EXPORTING:

Coal, Copper and all Other Descriptions of Metals, Minerals and Cereals, Chemicals, Oil, Paper, Glass, Canned Fish, Silk Goods, and General Oriental Products and Merchandise

---

IMPORTING:

Iron, Steel, Machinery, Machine Tools, Chemicals, and General Merchandise

---

ANNUAL PRODUCTION:

Electrolytic Copper Ingots	20,000	Tons
Pig Iron	100,000	,,
Steel	50,000	,,
Coal	3,500,000	,,

COLLIERIES:

Takashima, Ochi, Yoshinotani, Kishidake, Namazuta, Shinnew, Hojo, Kanada, Kamiyamada, Ashibetsu, Biba', O-Yubari, and Sakito

---

BRANCHES and AGENCIES:

Tokyo, Yokohama, Nagoya, Osaka, Kobe, Moji, Wakamatsu, Karatsu, Nagasaki, Otaru, Tsuruga, Kure, Muroran, Hakodate, Kushiro, Vladivostok, Dairen, Kirin, Harbin, Peking, Shanghai, Hankow, Hongkong, Canton, Tientsin, Tsingtao, Tsinan, Singapore, London, Paris, Lyon, Marseilles, Berlin, New York, Seattle.

STEAMSHIP DEPARTMENT—KOBE

Fleet Owned	25,000	Tons Gross
Chartered Steamers	12,000	,, ,,

Regular and Irregular Routes between home ports and Chinese and South Sea Islands Ports, etc.

MIIKE COAL

The Finest Steaming and Bunker Coals of the Far East are mined from the famed Miike, Tagawa, Yamano, Sunakawa and Kawakami Collieries operated by the

MITSUI

MINING COMPANY, LTD.

HEAD OFFICE:
No. 1 Surugacho, Nihonbashi-Ku,
TOKYO, JAPAN

Capital - - Yen 100,000,000

Annual Coal Output is equal to one-quarter of Total Japanese Mines.

LEAD, SILVER, GOLD, ZINC, COPPER, SPELTER, SULPHUR, COKE, IRON, CHEMICALS and DYES

Are produced from the Company's, KAMIOKA, Lead, Silver and Zinc Mine; SANO, Copper and Zinc Mine; KUSHIKINO, Gold Mine; KONGO, Tungsten Mine; IWAONOBORI, Sulphur and Metal Mine; Zinc Plants, Coke, Dyestuffs and By-products Establishments in Miike.

***Sole Agents for our Products*:**

MITSUI BUSSAN KAISHA, Ltd.

(MITSUI & Co., Ltd.)

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A Real Machine Tool

This Wall Radial Drill is a real machine tool in every sense of the word. It is properly designed and carefully constructed of the finest materials obtainable. Every feature has been added to insure ease of operation and accurate output. Your factory walls form the column of this machine and it proves as rigid under strain as any machine on the floor.

You save in first cost, floor space and operating time by insisting on L-F Wall Radial Drills.

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Machine Tools of Quality.

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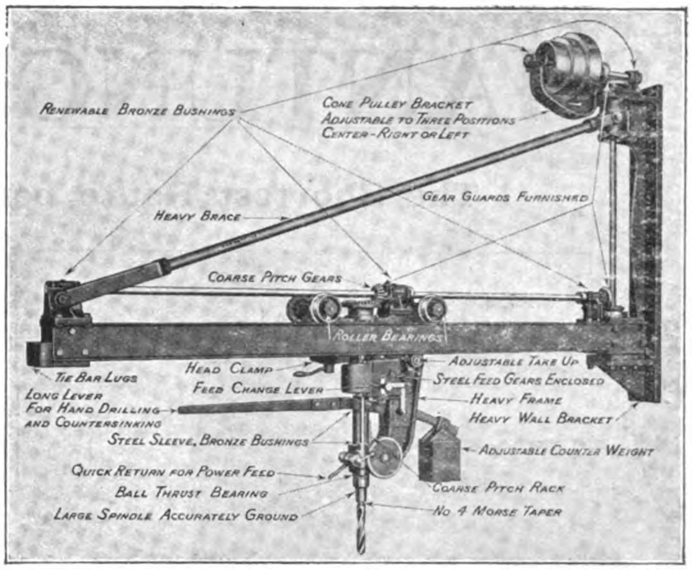
Boston 9, Mass., U.S.A.



MADE IN FOUR STANDARD SIZES

Rated size	Drills to centre of	Wall to end of arm
7-ft.	14-ft. circle	10-ft.
9-ft.	18-ft. circle	12-ft.
11-ft.	22-ft. circle	14-ft.
13-ft.	26-ft. circle	16-ft.

Other lengths of arm to suit requirements.

Trade Mark

FORMOSAN CANE

SUGAR

RAW, REFINED AND IN CUBES

FINEST **ALCOHOL** QUALITY

Formosa Sugar Manufacturing Co., Ltd.

(Taiwan Seito Kaisha, Limited)

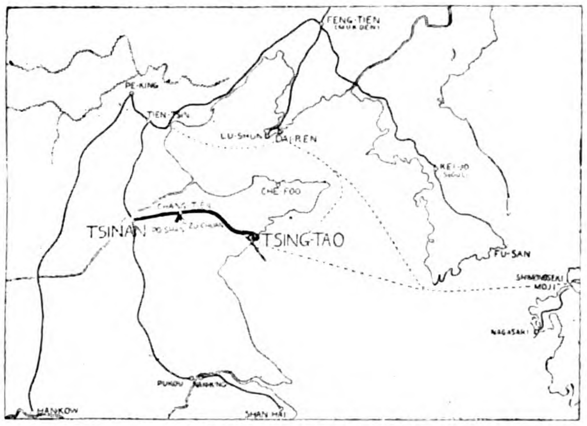
THE LARGEST SUGAR PRODUCERS IN ASIA

Operating the modern Mills with a grinding capacity of 7,800 tons of cane per day and two Alcohol Distilleries in Formosa, also Sugar Refinery in Kobe.

HEAD OFFICE:—Takau, Formosa, JAPAN.
TOKYO OFFICE:—22 Honkoku-cho, Itchome, Nihonbashi-ku.
SOLE AGENTS:—Mitsui Bussan Kaisha, Ltd. (Mitsui & Co., Ltd.).
Tokyo, London, New York, Lyon, etc.

SHANTUNG RAILWAY

The Shortest Route between Japan and North China



THROUGH TRAFFIC

Through passenger tickets are issued between the following principal stations of the Shantung Railway: Kiaochow, Kaomi, Fangtsu, Weihsien, Chingchow, Changtien, Chowtsun, Tsinan, Tzuchuan, Poshan, and the following points: In Manchuria—Port Arthur, Newchwang, Liaoyang, Fushun, Mukden, Tiehling, Kaiyuan, Changchun, Penchihu, Antung, and Dairen; in Japan—Tokyo, Yokohama, Nagoya, Kyoto, Osaka, Kobe, Ujina, Moji, Shimonoseki, Nagasaki and Shanghai.

Steamer Connections—Steamers leave the wharves of the Large Harbour, Tsingtao, for Moji and Kobe every five days, for Shanghai about twice a week and for Dairen about three times a week.

For giving facilities to through passengers for Japan, a special train in connection with the night train No. 4 is operated from the Harbour Station to the Wharf, direct alongside the ship, on those days when the liners of the Nippon Yusen Kaisha, Osaka Shosen Kaisha, and Harada S.S. Co. are leaving.

Through passengers and their luggage are carried free of charge for this section.

Collieries—The Tzuchuan (Shisen) and Fangtzu (Boshi) Collieries are managed by the Mining Department of the Shantung Railway. At present the daily output of Tzuchuan coal is about 1,500 tons, far surpassing the amount taken out when the Germans were in control. The coal is well-known for its good quality and fair price.

Tsinan—Tsinan, the capital of Shantung, is the western terminus of the Shantung Railway, and also one of the most important stations on the Tientsin-Pukow Railway.

The Tsinan Railway Hotel, furnished in modern European style, is found on the upper floor of the Tsinan Station, under the control of the Shantung Railway Administration.

THROUGH TRAIN SERVICE

Train No. 1 leaves Tsingtao daily 8.00 a.m. arrives Tsinan 6.30 p.m.
Train No. 3 leaves Tsingtao daily 7.00 p.m. arrives Tsinan 7.00 a.m.
Train No. 2 leaves Tsinan daily 9.00 a.m. arrives Tsingtao 7.30 p.m.
Train No. 4 leaves Tsinan daily 9.30 p.m. arrives Tsingtao 9.10 a.m.

Local Trains run between Tsingtao and Kaohi, Weihsien and between Fangtzu and Tsinan, and on the Poshan and Tzuchuan colliery branches.

Fares—Tsingtao-Tsinan—1st class, $14.30; 2nd class, $7.20.

First Class Sleeping Car—A first-class sleeping car is attached to night trains Nos. 3 and 4 running between Tsingtao and Tsinan. For a berth in the sleeping car in S.Y. 3.00 for the lower berth and S.Y. 2.00 for the upper berth is charged in addition to the ordinary first-class fare, irrespective of distance.

Dining Car—A dining car is attached to through trains Nos. 1, 2, 3 and 4 running between Tsingtao and Tsinan. Meals are served to order at any time.

Ticket Agencies—Messrs. Thos. Cook & Son and their branch offices in various parts of the world. The Japan Tourist Bureau in Tokyo and their Agents in Yokohama, Kobe, Nagasaki and Peking.

Connections at Tsingtao—By steamer with Japan, Manchuria and Shanghai.

Connections at Tsinan—By Tientsin-Pukow Line with Tientsin, 6.00 & 9.38 a.m. daily, and with Pukow, 7.43 & 10.21 p.m. daily.

BATHING BEACH, TSINGTAO.

Description of Tsingtao

Tsingtao is considered the most healhful place in all the Far East. The scenery including both mountains and sea, is most beautiful. There are quite extensive forest gardens, bits of woodland here and there, and many delightful shady lanes affording most interesting walks through them.

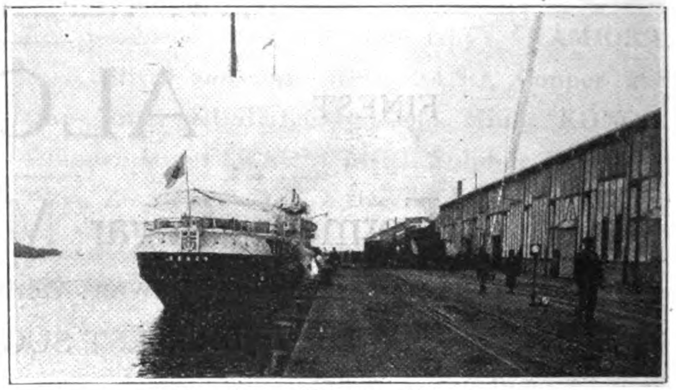
The roads are all broad, with very moderate gradients. They are of both macadamized and asphalt construction for vehicle traffic, while the sidewalks are either paved or concrete. These streets are practically all lined with beautiful shade trees.

The buildings are constructed principally in modern European style, with red tiles and white walls, contrasting pleasantly with the surrounding green mountains and blue sea.

The climate here is fine from Spring to Autumn, being neither too hot nor too cold. These climatic conditions make the place a favourite summer resort for Europeans and Americans from Shanghai, Tientsin, and other places.

The hotels are luxuriously furnished with up-to-date equipment and are under the efficient management of Mr. H. J. Hearne.

The hotel rates are $6.00 and up, per day, on the American plan.



THE GREAT HARBOUR, TSINGTAO

For Further Information, please apply to

THE SHANTUNG RAILWAY ADMINISTRATION, TSINGTAO

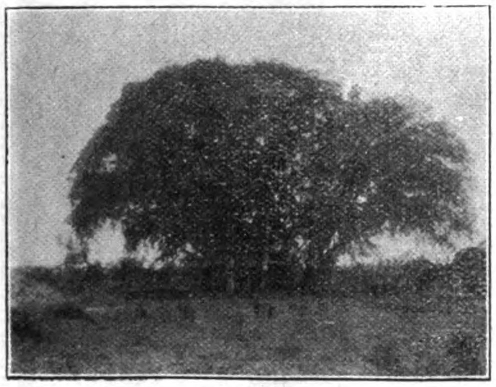
CABLE ADDRESS: "SANTETSU" CODES: A.B.C. 5TH ED. & AI.

JAVA—THE WONDERLAND

HAVE YOU NOT YET VISITED JAVA?
IF NOT, DO SO NOW!

Bridge Bi Cis, Soerabaia Goods-shed, Java State Railways, Soerabaia City.

Girl Carrying Capoc.



Waringin.

Java, the peerless gem in that "magnificent Empire of Insulinde, which winds about the equator like a garland of emeralds," is the ideal tropical island, the greenest, the most beautiful and the most exquisitely cultivated spot in the East, the most picturesque and satisfactory bit of the tropics anywhere near the world's great routes of travel.

It fulfils the conception of what a paradise ought to be. It satisfies the imagination and more—for no Northern imagination ever conceived of skies so soft or indolent as these, of seas so serene and beautiful, of landscapes so exquisite or of nature so bountiful.

There is something here for every taste. The sportsman will find excellent big game shooting—the architect and the archeologist will delight in exploring the ruins of Buddhistic and Hinduistic temples. Those studying social and political problems resulting from colonial possessions can study here one of the most successful colonial systems existing. The geologist will grow enthusiastic over the many volcanoes active or quiescent, found here. At Buitenzorg, one hour's run from Batavia, the botanist has at his disposition the largest and best equipped Botanical gardens of the universe. The agriculturist will delight in the many cultures as f.i. rice, tea, coffee, rubber, etc., found here. Moreover, travelers are entirely safe in Java and even ladies alone can tour the island without inconvenience.

And to close this incomplete list of Java's advantages, it is singularly accommodating as regards climate. Thanks to the mountainous character of its physical conformation, and the different altitudes of its towns and hill stations, the visitor can select the climate best suited for his constitution. In a few hours he may change from the tropics to the temperate zone, may migrate from Batavia to Sindanglaja, 3,483 feet above the sea-level, or from Soerabaia to Tosari, at an altitude of 5,776 feet, and famous for its bracing air.

Few tourist playgrounds, in fact, are so favored, or possess a greater variety of attractive features.

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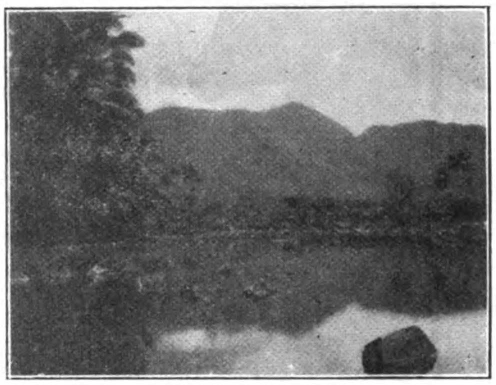
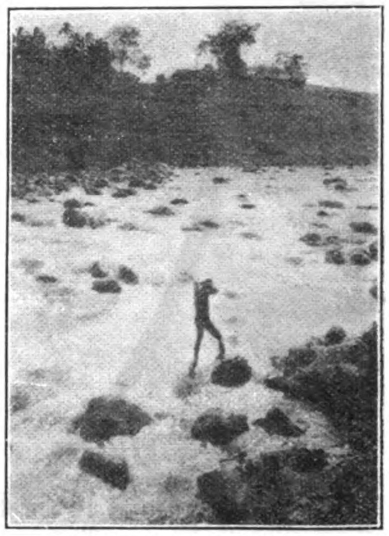
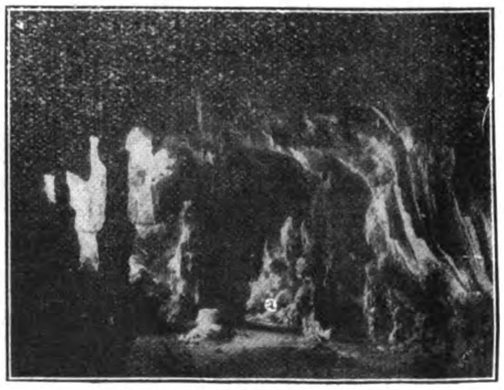


Pond in the Neighborhood of Garoet.



River Brantas, Malang.



Caves, South Coast, Java.

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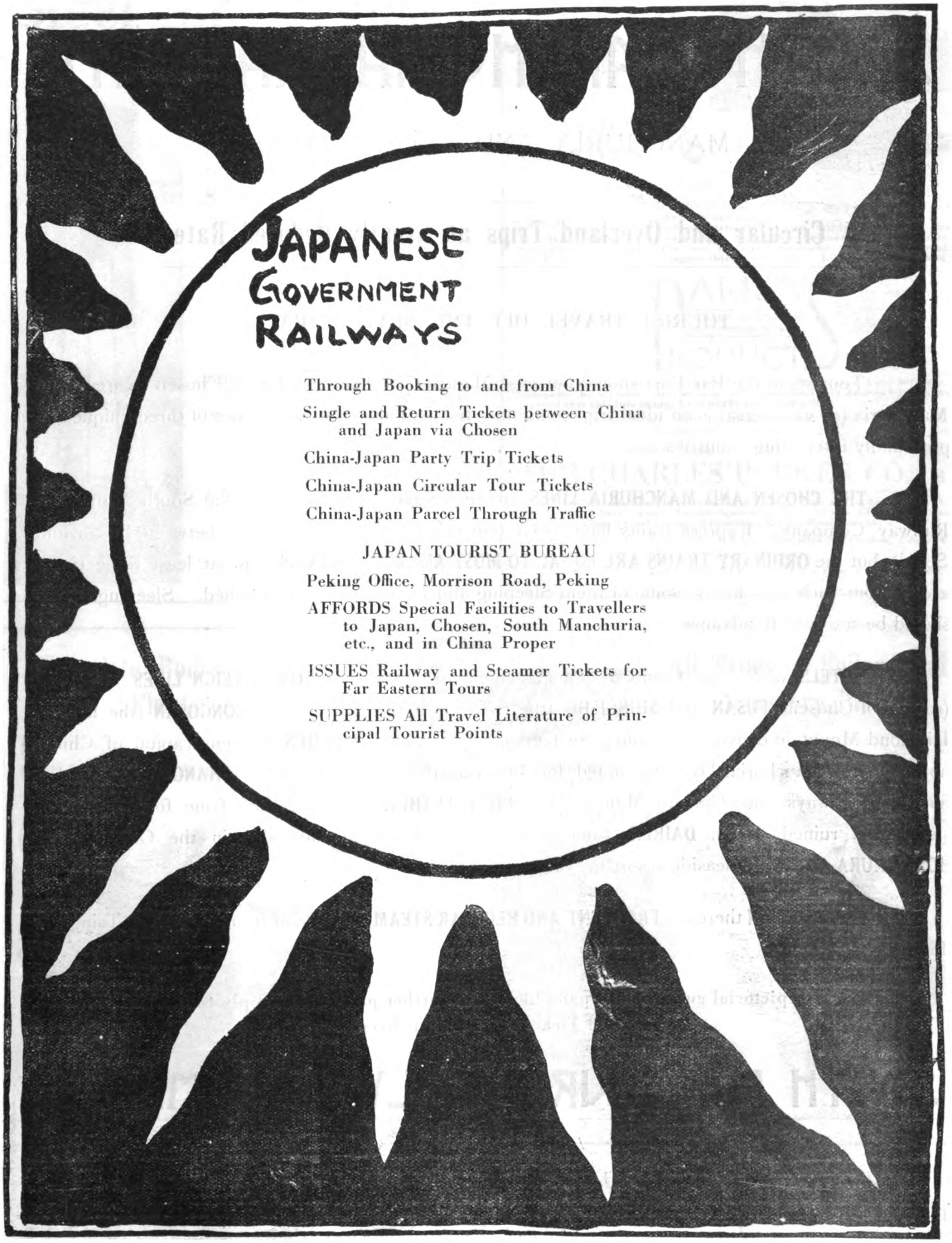
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FROM DAIREN there are **FREQUENT AND REGULAR STEAMERS** to and from Shanghai, Tsingtao, Tientsin, etc.

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Branch Offices: TOKYO, SEOUL, HARBIN, KIRIN, PEKING, SHANGHAI AND NEW YORK.

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A steel tank is long-lived, requires almost no outlay for upkeep, and will operate successfully in any climate.

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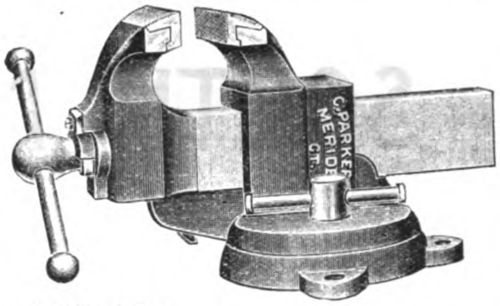

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"BUILT UP TO A STANDARD NOT DOWN TO A PRICE"

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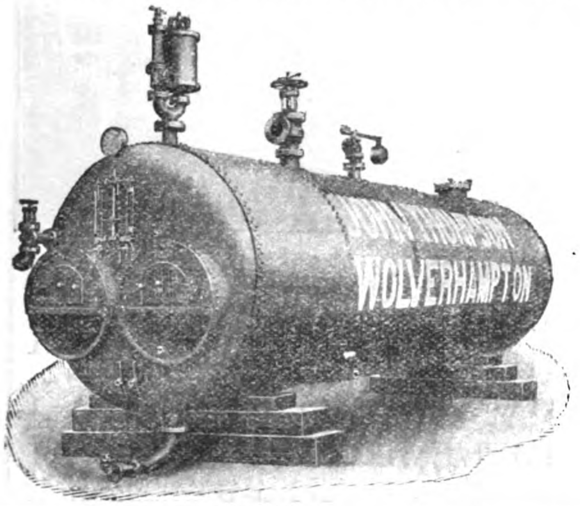

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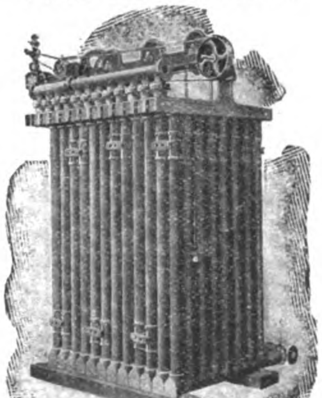

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WEEKLY ENGINEERING SUPPLEMENT

Information on Business Opportunities

EXISTING ENTERPRISES
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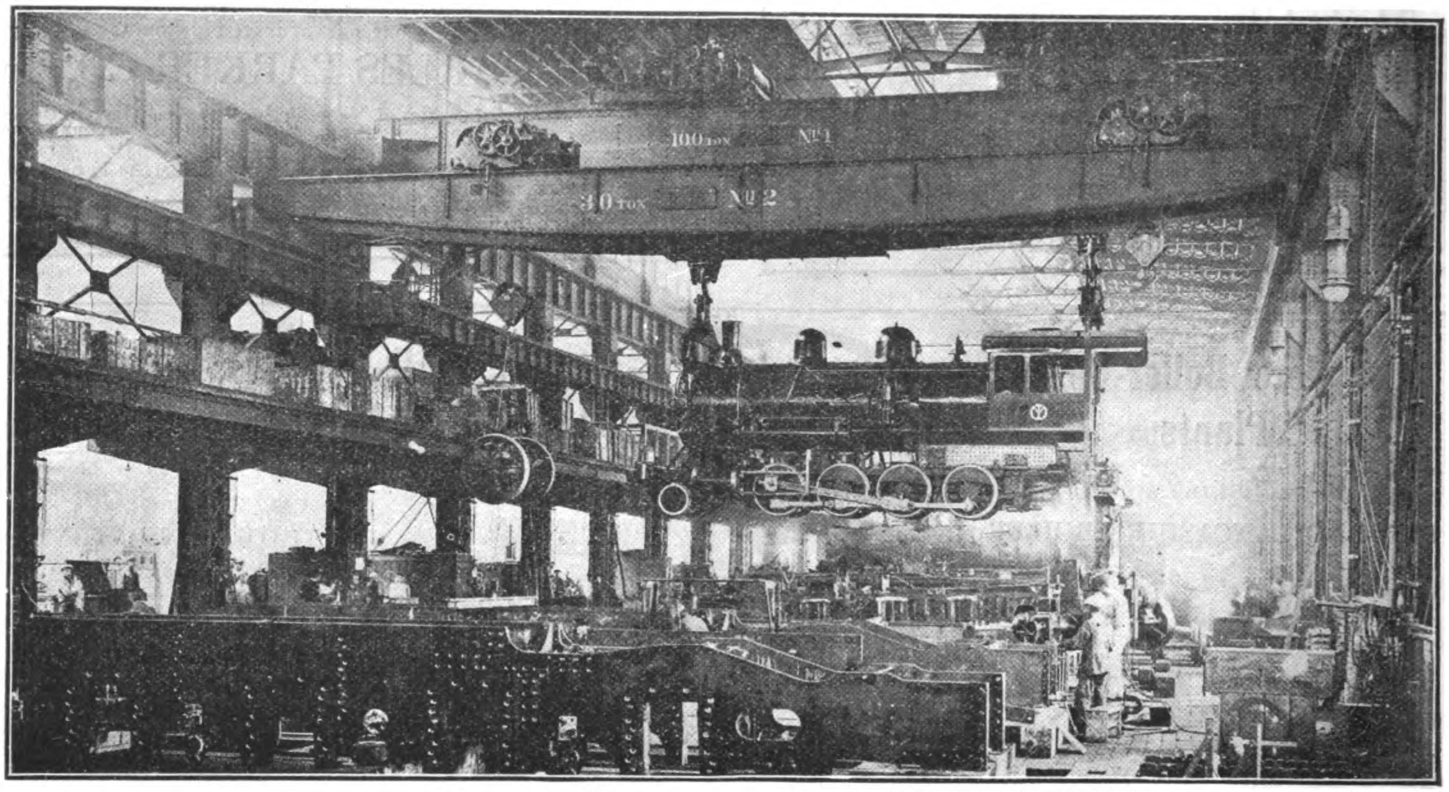
SOUTH MANCHURIA RAILWAY

SHAKAKO RAILWAY WORKSHOPS



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LARGEST AND MOST COMPLETE IN ALL MANCHURIA AND CHINA

AREA OF LAND: About 300,000 Tsubo. OFFICES & WORKSHOPS, 14,000 Tsubo

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THE EAST IS EAST AND THE WEST IS WEST

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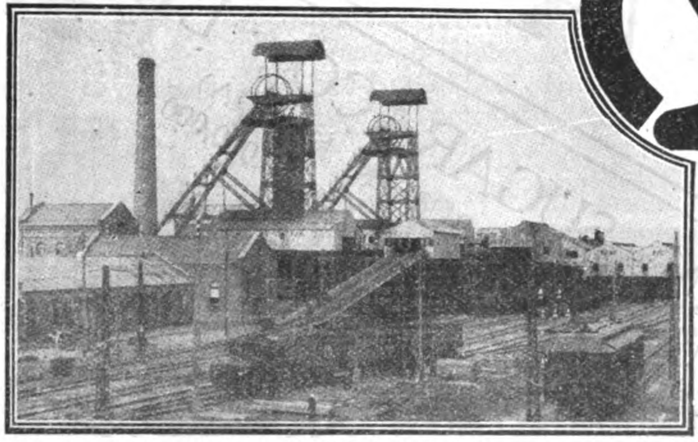
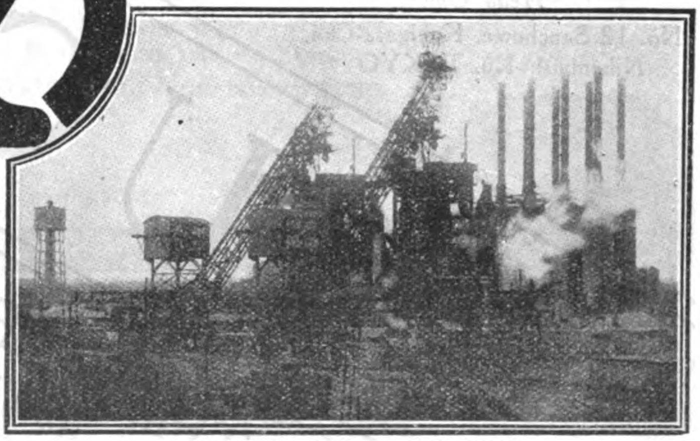


Togo Pit of the S.M.R. Fushun Collieries



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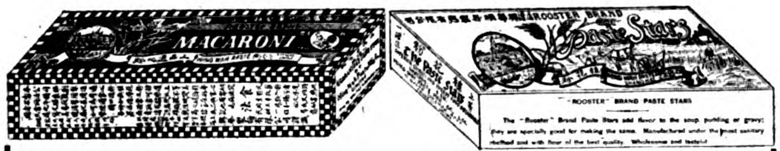

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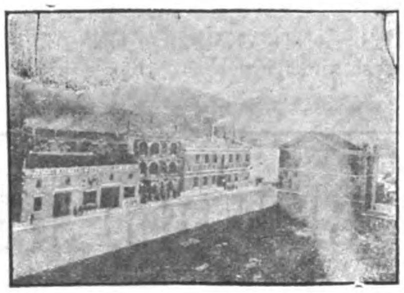

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FIG. W2621
IRON BODY GATE VALVE

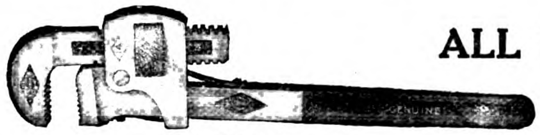

FIG. W4104

ALL WALWORTH QUALITY

FIG. W1323
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Standard Malleable Fittings and Nipples, Extra Heavy Cast Iron Fittings, Hydraulic Steel Fittings, "Kewanee", National and Oil Country Flange Unions, Power Plant Material of all Kinds.

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FIG. W3782
IRON COCK

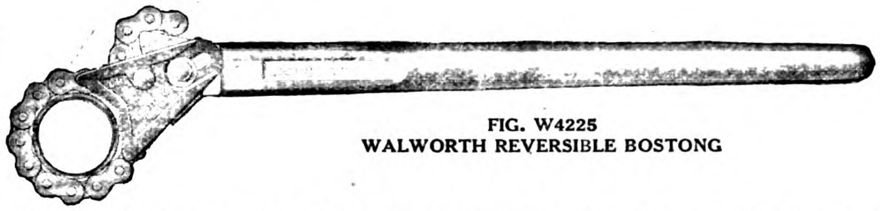

FIG. W4225
WALWORTH REVERSIBLE BOSTONG

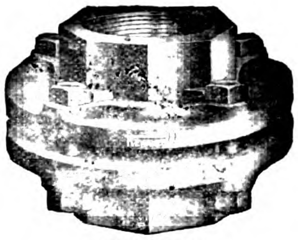

FIG. W2351
"KEWANEE" FLANGE UNION

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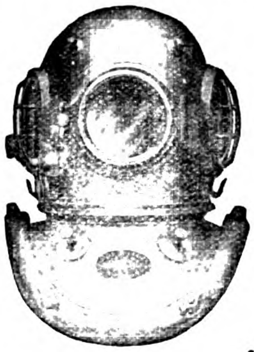

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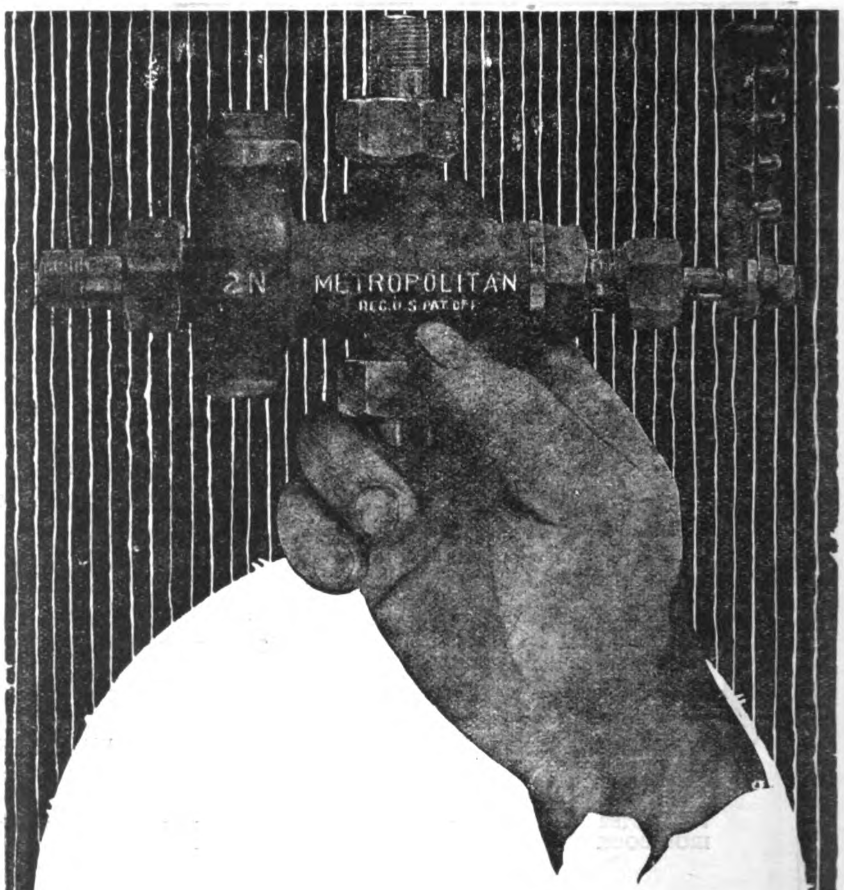

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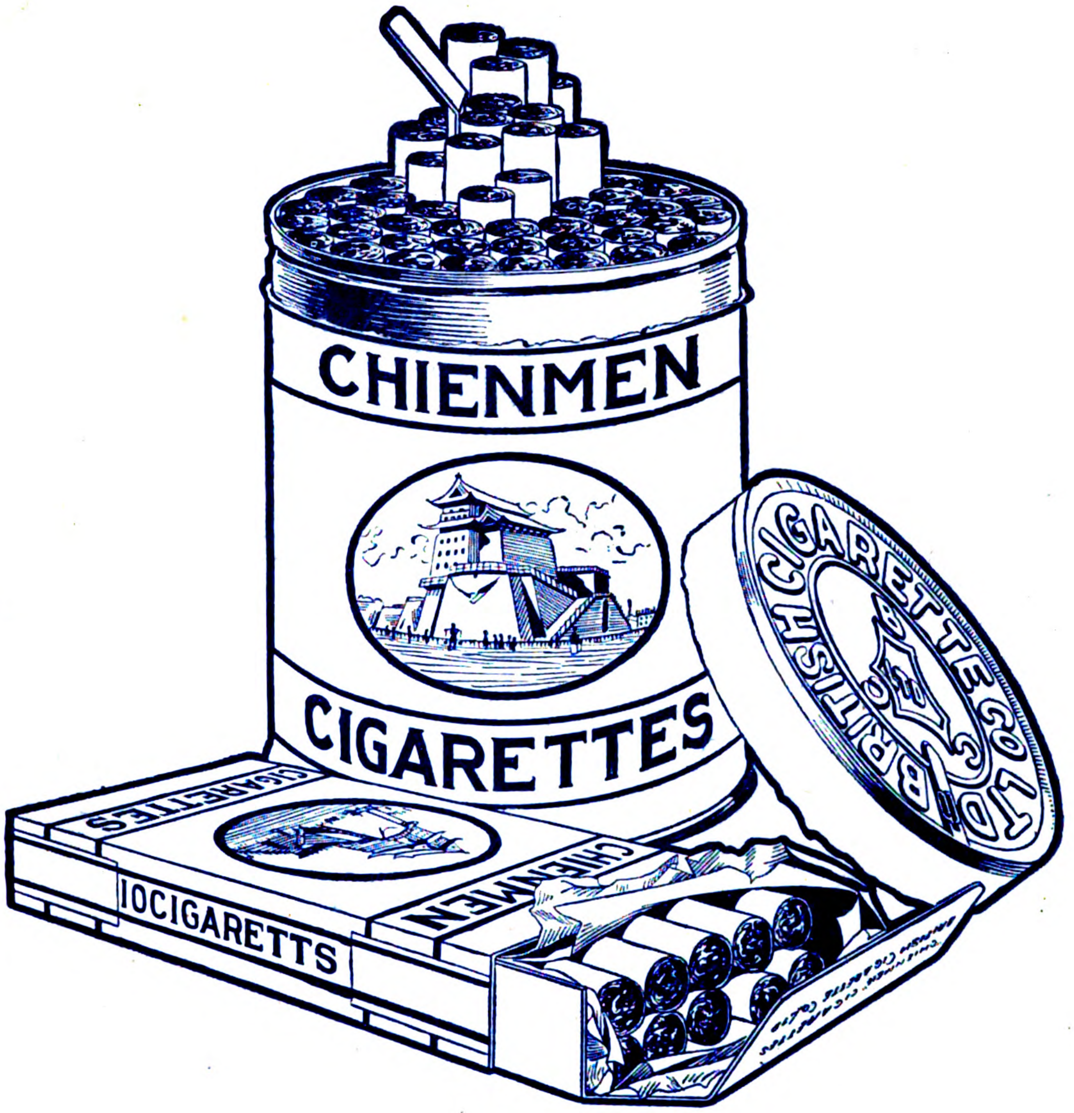
CHIENMEN

Cigarettes



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THE FAR EASTERN REVIEW

FINANCE ENGINEERING COMMERCE

上海仁記路第五號

遠東時報

THE PORT OF KOBE

Mining Development in Korea

The Manila Railway

Communications in Java

A Victory for Peace

Vol. XVII · September, 1921 · No. 9

A. L. TAYLER.

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DENNIS

Overseas Model has been designed especially to suit the particular climatic conditions of the country in which it has to work, and is built in such a way as to withstand all shock due to uneven road conditions that may be encountered.

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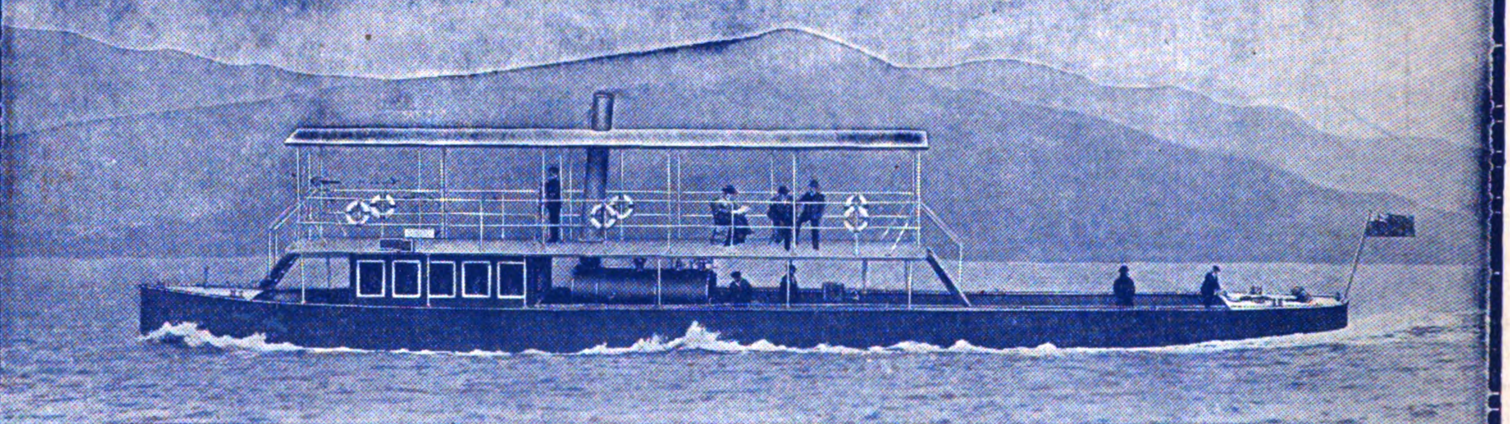

Length 75-ft., beam 9-ft. 3-in., draught 12-in., speed 10 miles an hour.

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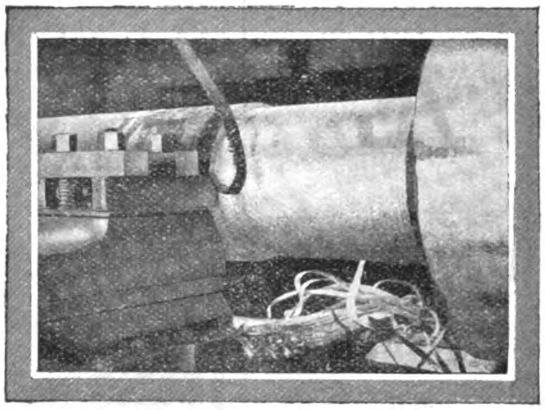

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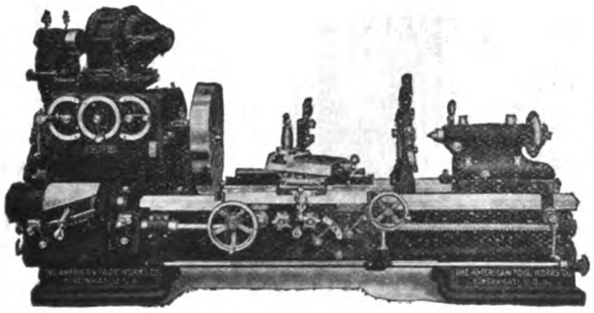

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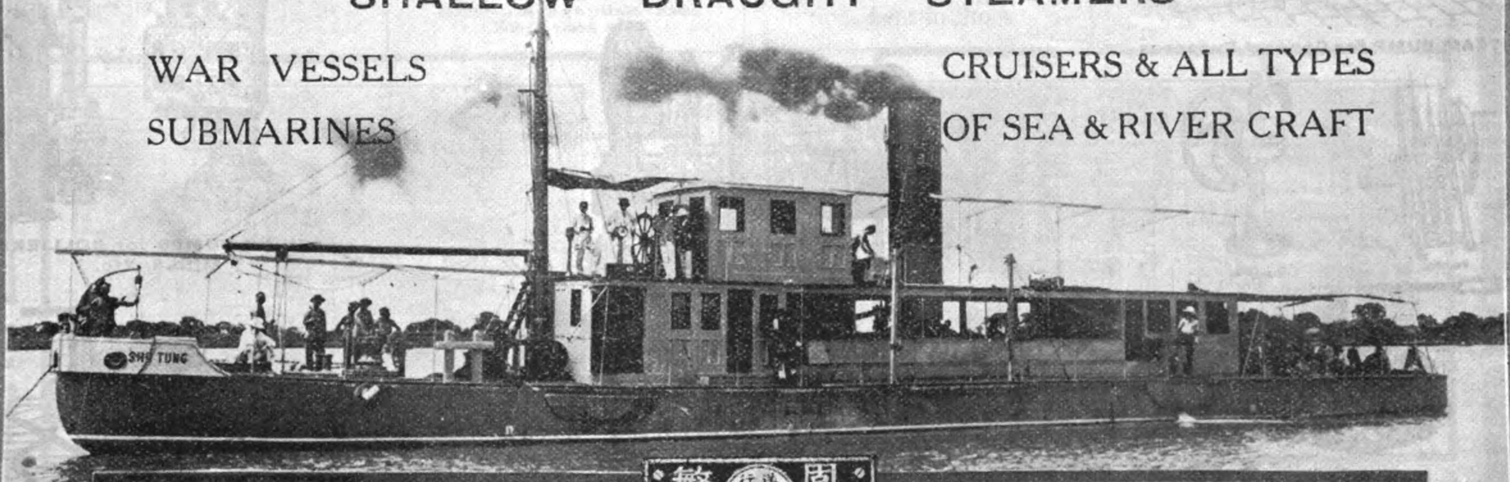

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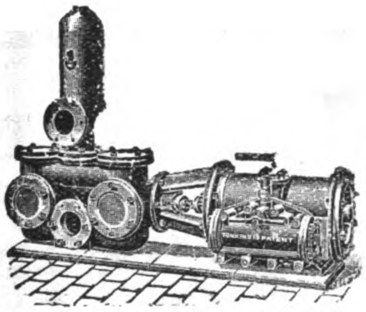

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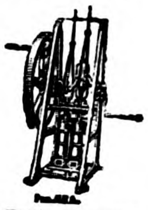

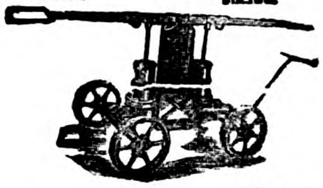

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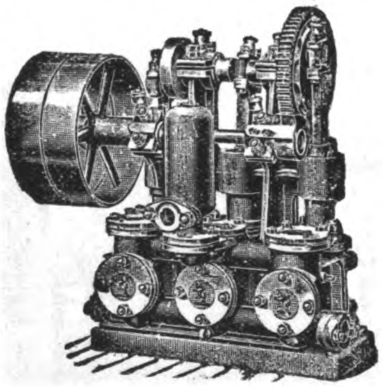

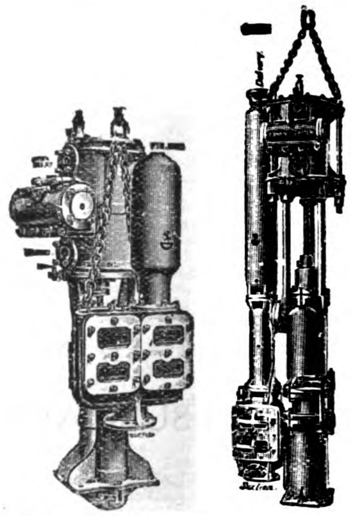

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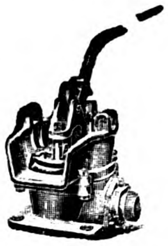

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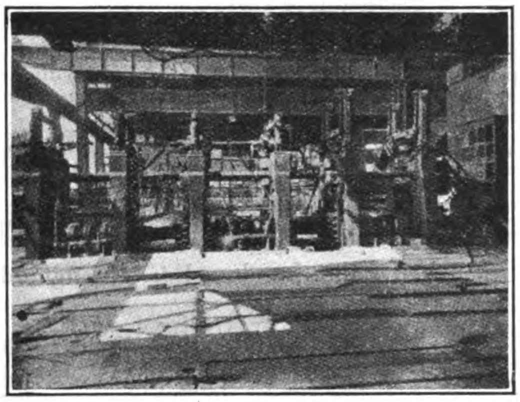

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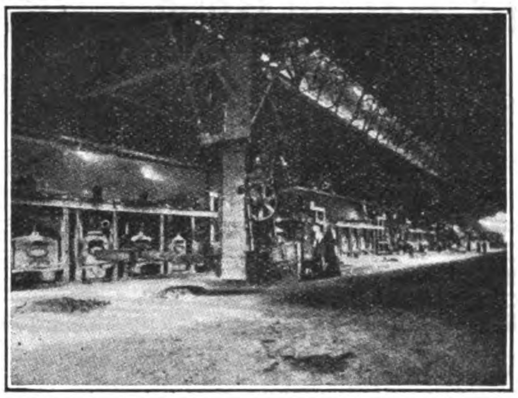

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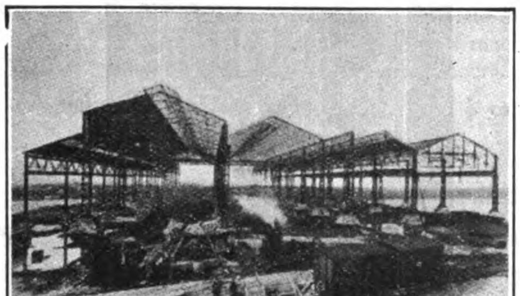

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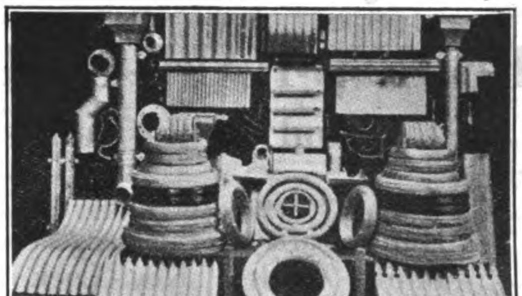

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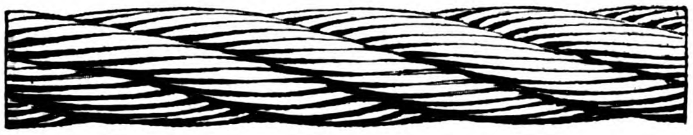

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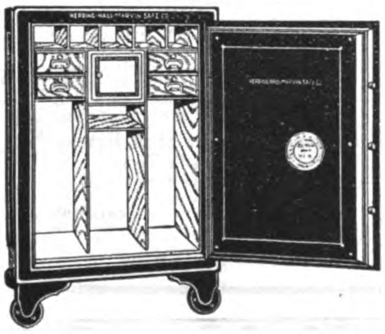

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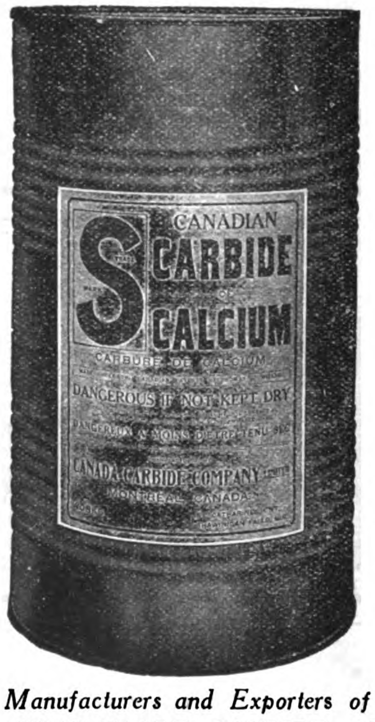

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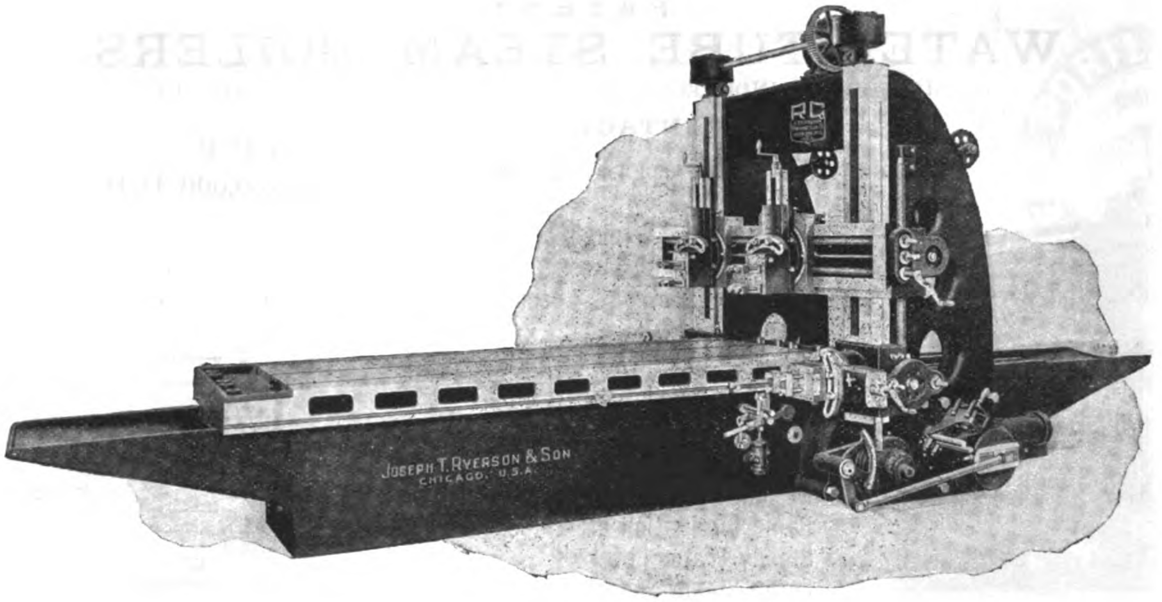

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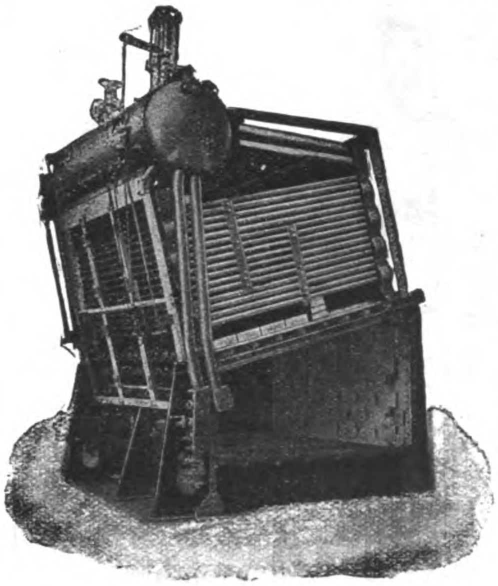

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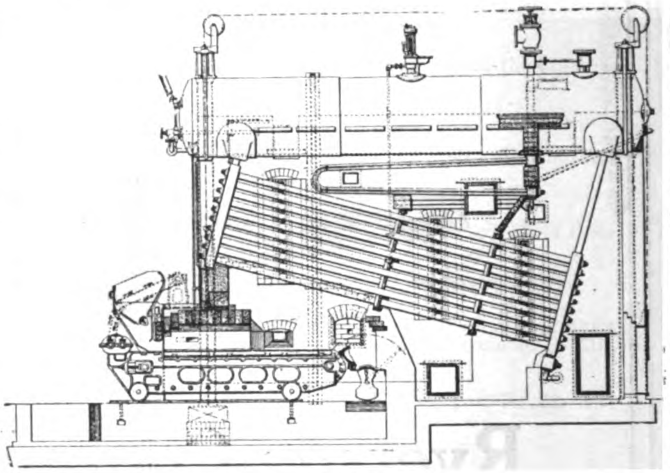

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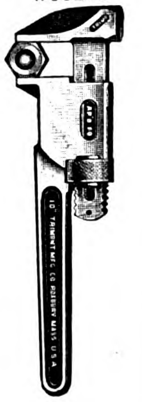

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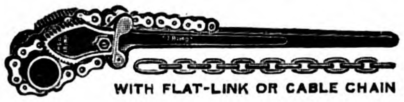

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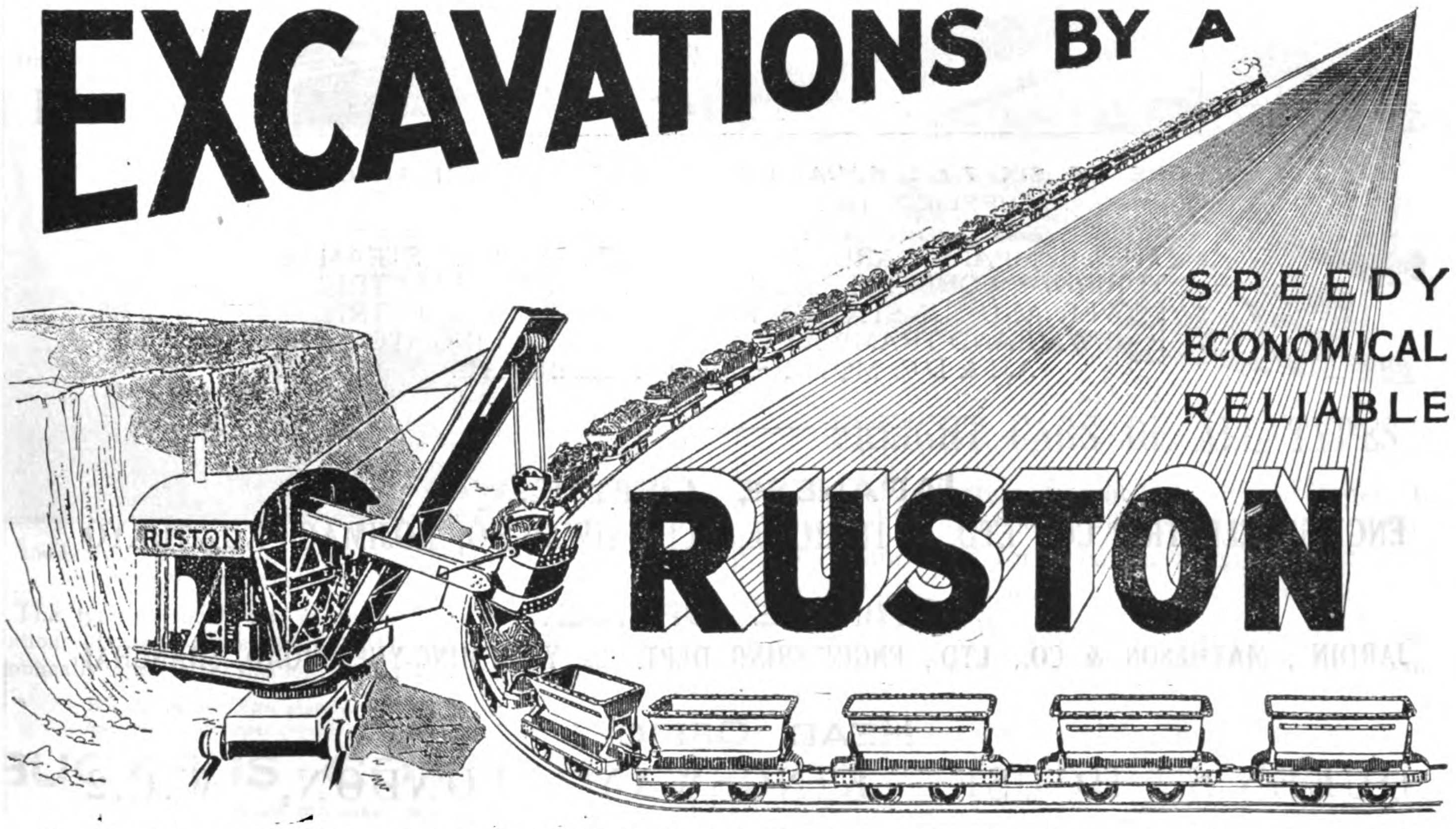

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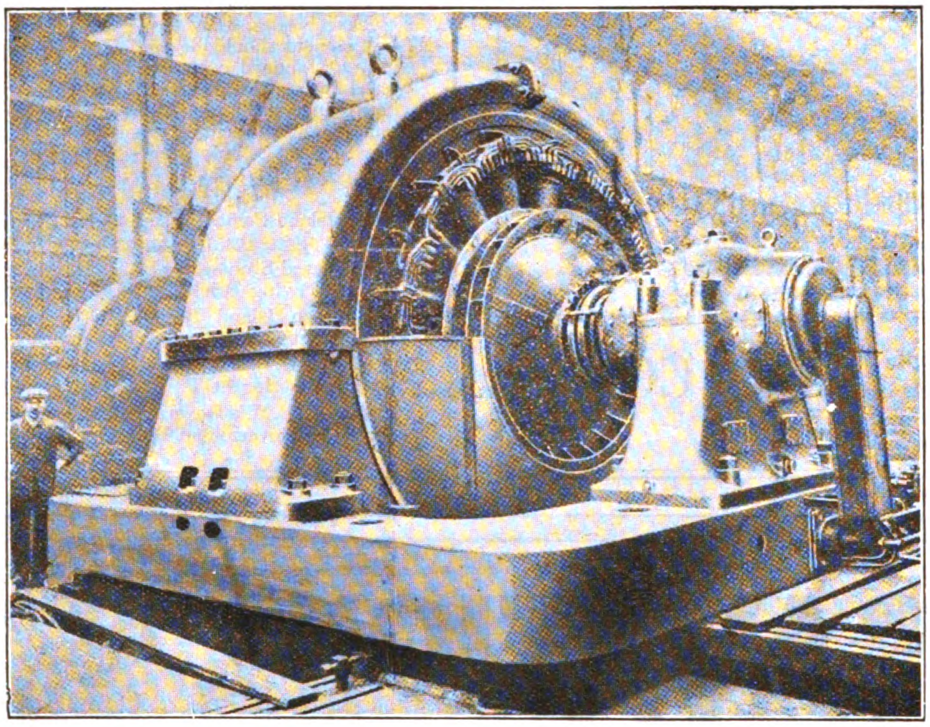

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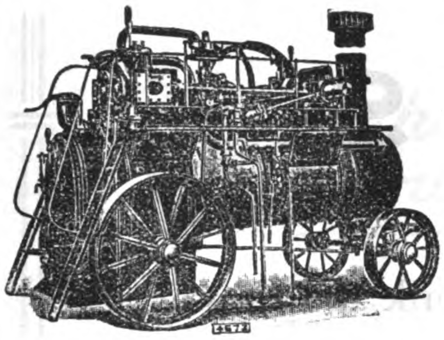

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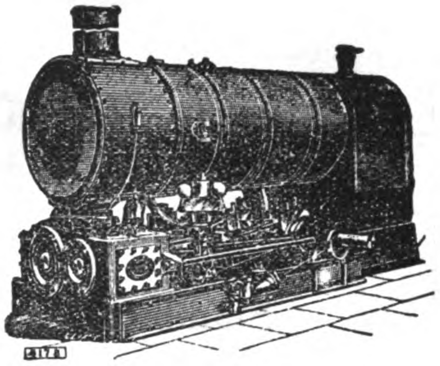

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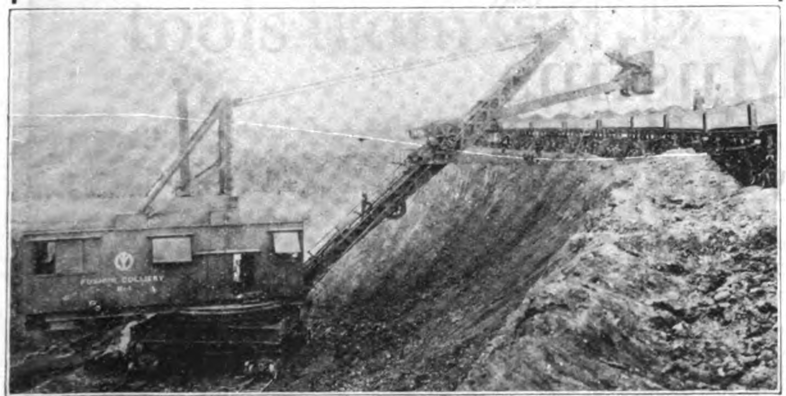

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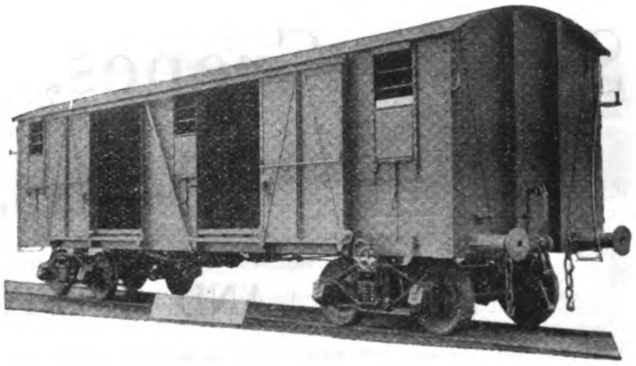

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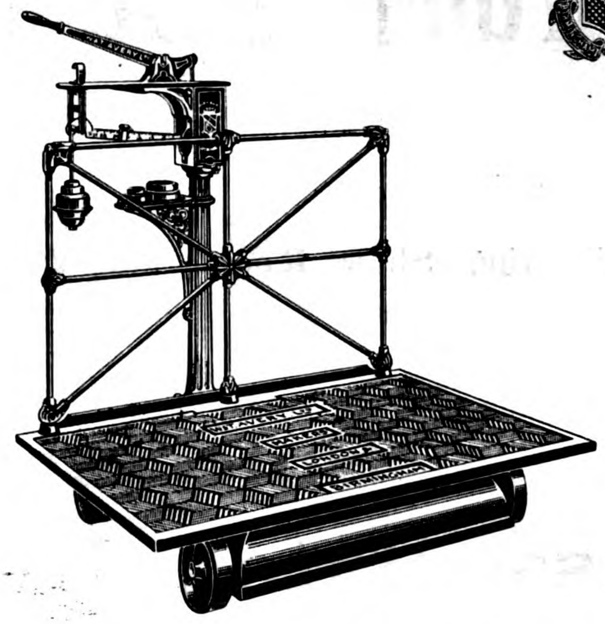

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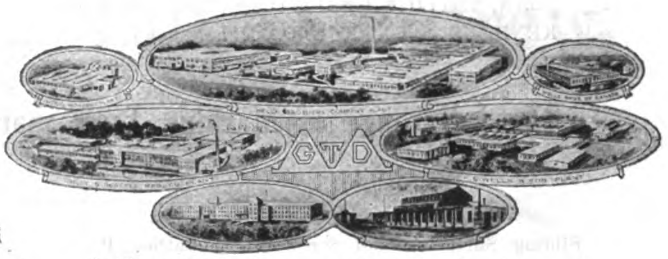

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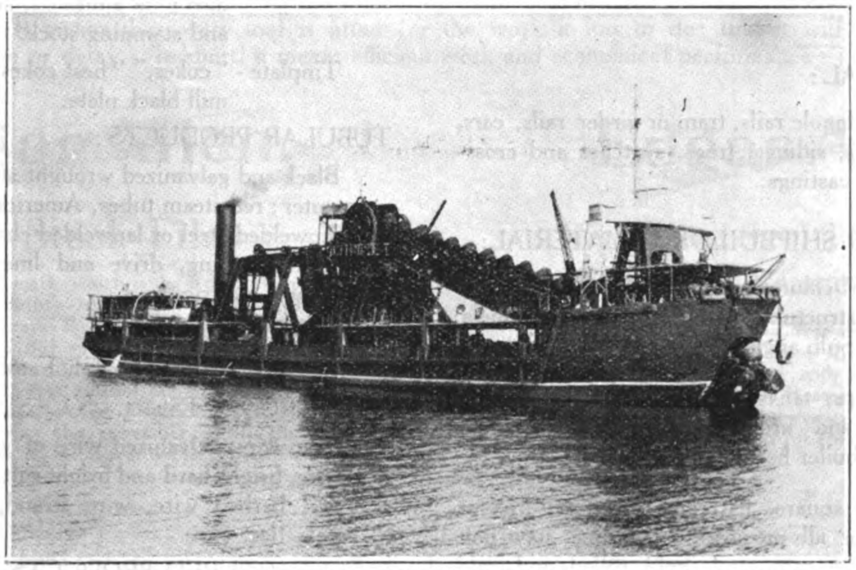

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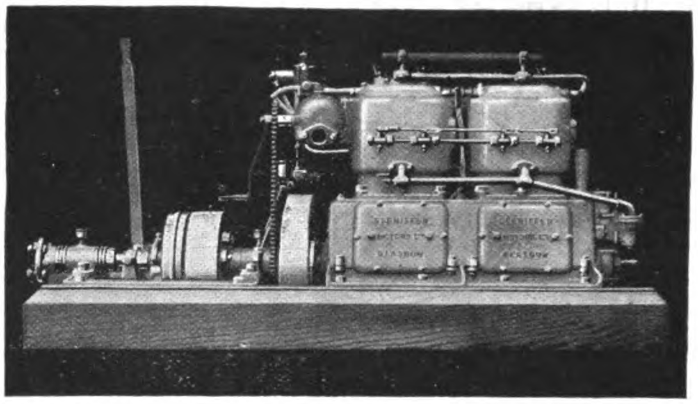

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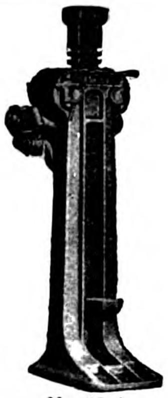

No. 25-A
General purpose Industrial and Car Jack.

PITTSBURGH STEEL CO.

Pittsburgh, Pennsylvania, U.S.A.

Manufacturers of "PITTSBURGH PERFECT"

OPEN HEARTH STEEL PRODUCTS

INCLUDING

Galvanized Wire, Bright Hard Wire, Bright Nail Wire, Annealed Wire, Bright Soft Wire, Bolt and Rivet Wire, Galvanized Barbed Wire, Wire Nails, Fence Staples

Pig-Iron, Blooms, Billets, Wire Rods, Hard Spring Coil Wire, Twisted Cable Wire, Bale Ties, Steel Hoops, Steel Bands, Cotton Ties and Fabricated Stock, Poultry and Lawn Fencing.

We are prepared to give PROMPT SERVICE, and solicit your inquiries accompanied by complete specifications.

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PITTSBURGH STEEL CO.

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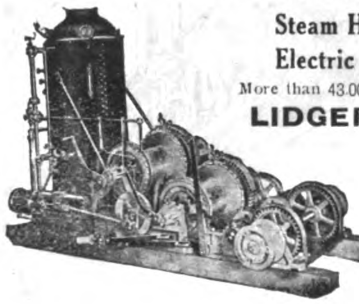
Cable Address: "PITTSTEEL."

LIDGERWOOD

HOISTING ENGINES

For Every Purpose



Steam Hoists built up to 1,000 H.P.

Electric Hoists built up to any size

More than 43,000 Engines and Hoists built and in use.

LIDGERWOOD MFG. CO.

96 Liberty St., New York, N.Y., U.S.A.
Friars House, New Broad St., London, E.C.

Andersen, Meyer & Co., Ltd.

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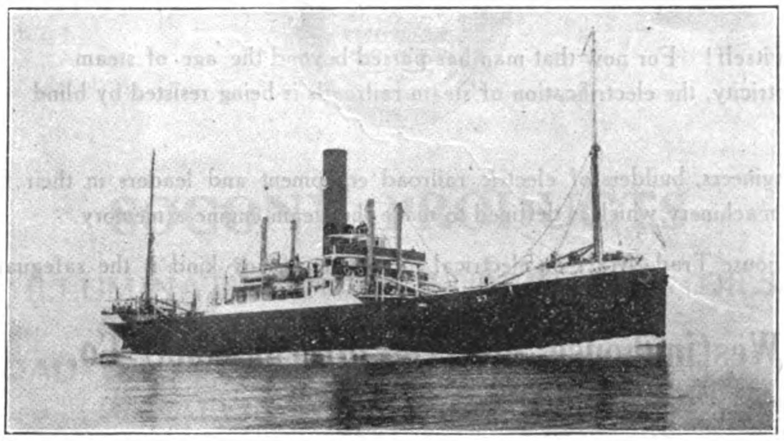
THE BURNTISLAND SHIPBUILDING COMPANY, LIMITED

MANUFACTURERS OF ALL TYPES OF STRUCTURES IN STEEL, TANKS, GIRDERS, ETC., FOR EXPORT



One of our recently constructed vessels on trial, steaming 13 knots.

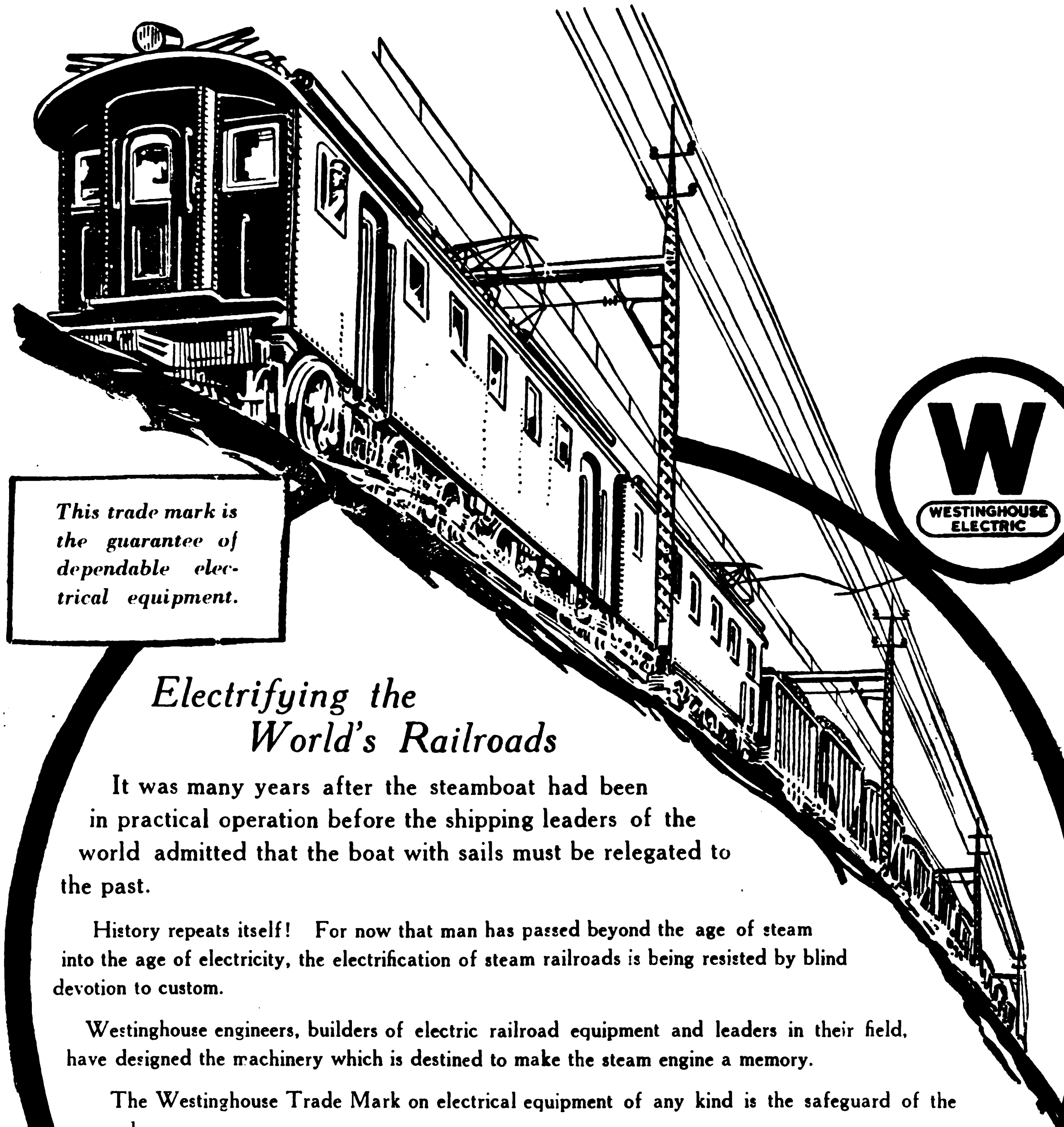
BARGES, YACHTS, SHALLOW DRAFT VESSELS, TUGS, CARGO STEAMERS, PASSENGER STEAMERS, AND ALL TYPES OF FLOATING CRAFT

SHIPBUILDERS

BURNTISLAND, FIRTH OF FORTH, SCOTLAND.

Westinghouse

ELECTRICAL APPARATUS FOR EVERY PURPOSE



This trade mark is the guarantee of dependable electrical equipment.

WESTINGHOUSE ELECTRIC

Electrifying the World's Railroads

It was many years after the steamboat had been in practical operation before the shipping leaders of the world admitted that the boat with sails must be relegated to the past.

History repeats itself! For now that man has passed beyond the age of steam into the age of electricity, the electrification of steam railroads is being resisted by blind devotion to custom.

Westinghouse engineers, builders of electric railroad equipment and leaders in their field, have designed the machinery which is destined to make the steam engine a memory.

The Westinghouse Trade Mark on electrical equipment of any kind is the safeguard of the purchaser.

Westinghouse Electric International Co.

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19

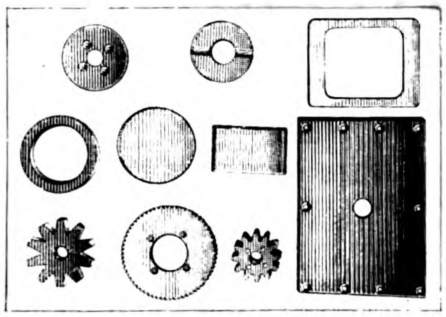
This space will show monthly a new aspect of one of the great industrial institutions of the world.

CONDENSITE CELORON

A Remarkable Waterproof Insulation Material

CONDENSITE CELORON, made from a fabric base or a base of Diamond Fibre (genuine vulcanized fibre) thoroughly impregnated with water-resisting Condensite, possesses the high dielectric properties of the well-known Condensite products together with the physical properties of Diamond-Fibre.

CONDENSITE CELORON for insulation and insulating parts is especially valuable for service under damp or moist conditions. It will not warp, shrink or swell through exposure or age. It can be readily machined and is therefore adaptable for many purposes. It is insoluble in all ordinary organic solvents.



CONDENSITE CELORON is made in sheets, rods and tubes. From these are machined panels, frames, bases, spool heads, coils, handles, levers, wireless apparatus and innumerable other insulating parts. CONDENSITE CELORON is also used for noiseless gears.

Ask us for full details.

Diamond State Fibre Company

BRIDGEPORT, PA. (Near Philadelphia), U.S.A.
Agents: AMERICAN TRADING COMPANY
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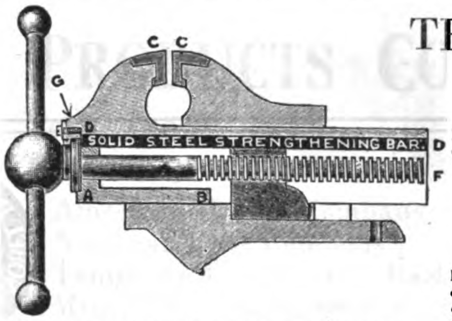


THE PARKER VICE

Long years of experience and determination to produce the

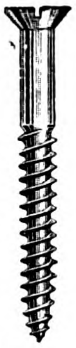
BEST VICE OBTAINABLE

has resulted in world-wide recognition of the superiority of the Parker Vice.

One of the exclusive features that assure great strength in this vice is the solid wrought-steel strengthening bar inserted along the entire length of the slide. This insures strength, durability and rigidity where, in ordinary vices, failure from weakness is so common. Parker Vices are furnished with stationary swivel bases.

PARKER WOOD SCREWS, made of brass and iron, nickel-plated, galvanized or blued to resist rust, with gimlet points, uniform slots and flat, round, oval or fillister heads.

Parker Vices and Wood Screws like all the famous



PARKER'S PRODUCTS
"BUILT UP TO A STANDARD NOT DOWN TO A PRICE"

illustrate the great care taken to put into the hands of importer, dealer, and consumer products that can be relied upon.

Illustrated catalogue, with attractive trade terms, sent upon request. Correspondence in all languages.

ADDRESS EXPORT DEPARTMENT, DIVISION A.

THE CHARLES PARKER CO., Inc.

We are also manufacturers of Alarm Clocks, Bath Room Accessories, Coffee Mills, Cork Pullers, Lamps, Lemon Squeezers, Piano Stools, Chairs and Benches, Shot Guns, Tinned Steel Spoons, Knives and Forks.

25 Murray Street, New York, N.Y., U.S.A. Factories in Meriden, Conn., U.S.A.
ESTABLISHED 1832
Representative in India: ELLIOTT & CO., Clive Row, Calcutta, India

STANDARD OIL COMPANY OF NEW YORK

26 BROADWAY NEW YORK

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SOCONY
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PETROLEUM PRODUCTS
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SOCONY PRODUCTS

ILLUMINATING OILS, LUBRICATING OILS
GASOLINE AND MOTOR SPIRITS
ROAD OILS AND ROAD BUILDING MATERIAL
PARAFFINE WAX AND CANDLES
LAMPS, STOVES AND HEATERS

Branch Offices in the Principal Cities of

JAPAN INDO-CHINA PHILIPPINE ISLANDS NETHERLANDS INDIA SOUTH AMERICA
CHINA SIAM STRAITS SETTLEMENTS INDIA THE LEVANT

NOBEL INDUSTRIES
LIMITED

(Hitherto known as EXPLOSIVES TRADES LIMITED)

A COMPANY COMPRISING AMONG OTHERS THE FOLLOWING UNDERTAKINGS:—
Australian Explosives & Chemical Co. Ltd. Wm. Bennett, Sons & Co. Ltd. Bickford, Smith & Co. Ltd. British Electric Detonator Co. Ltd. British Pluviusin Ltd. British South African Explosives Co. Ltd. British Westfalite Ltd. Continuous Reaction Co. Ltd. Curtis's & Harvey Ltd. E.C. Powder Co. Ltd. Edison Accumulators Ltd. Eley Brothers Limited. Elterwater Gunpowder Co. Ltd. R. & T. Jack & Co. Ltd. King's Norton Metal Co. Ltd. Kynoch Limited. Lancashire Explosives Co. Ltd. Lighting Trades Limited. New Explosives Co. Ltd. Nobel's Explosives Co. Ltd. Roburite & Ammonal Ltd. Schultze Gunpowder Co. Ltd. Sedgwick Gunpowder Co. Ltd. Sheraton Glass Manufacturing Co. Ltd. Thermit Limited. W. H. Wakefield & Co. Ltd. A. Walker & Co. Ltd.

LIST OF PRODUCTS
for which enquiries are invited.

BLASTING EXPLOSIVES of all kinds. Dynamite, Gelignite, Gelatine Dynamite, Blasting Gelatine and Gunpowder.
PERMITTED EXPLOSIVES. Specially tested and authorised by the British Government for use in Gaseous Mines.
DETONATORS. Electric Detonators, Safety Fuse, and all Blasting Accessories.
NAVAL AND MILITARY EXPLOSIVES. Cordite, Nitrocellulose Powder, Ballistite, Tri-nitro-toluol, Guncotton.
MILITARY AMMUNITION. Rifle, Revolver, and Artillery.
SPORTING POWDERS AND CARTRIDGES of all kinds.
SIGNALS. Distress and Fog Signals.
INDUSTRIAL COLLODIONS ("Necol" Brand, Regd.), Collodion Cotton for Celluloid; Artificial Silk and Leather; Collodion Varnishes and Lacquers for all industrial uses.
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CHEMICALS, ACIDS, FERTILISERS, etc.
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MACHINE TOOLS of all descriptions. BICYCLES and Accessories.
LAMPS. Blow Lamps of all sizes. MOTOR LAMPS and Accessories.
ENGINEERING Tools and Presses. NAILS.
INCANDESCENT MANTLES for Gas, Oil and Acetylene.
METAL POWDERS. Bronze, Aluminium, etc.
THERMIT WELDING COMPOUNDS (Carbon free metals).
FERRO-ALLOYS, Ferro-Tungsten, Wolfram Ore.

Head Office: 6 CAVENDISH SQUARE, LONDON, W.1

UNITED STATES STEEL PRODUCTS COMPANY

30 Church St., New York, U.S.A.

Sole Exporters of the Products of

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Ilinois Steel Company
American Steel & Wire Company
American Sheet & Tin Plate Company
The Lorain Steel Company
American Bridge Company
National Tube Company
Tennessee Coal, Iron & Railroad Company
Minnesota Steel Company
Canadian Steel Corporation
Chickasaw Shipbuilding and Car Company

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Batavia, Java
Birmingham, England
Bombay, India
Brussels, Belgium
Buenos Aires, Argentine Republic
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Christiania, Norway
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Glasgow, Scotland
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Santiago, Chile
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Toronto, Canada
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We give prompt attention to inquiries for all class of our Steel Products, including the following:—

Aerial Tramways—Reversible, specially designed
Alloy Steel
Alloy Steel Sheets
Ammonia Cylinders
Angles
Armatur Sheets
Axles—Locomotive, Railroad and Tramway Cars
Bamboo Steel
Barbed Wire
Bars—Steel, Concrete Reinforcement
Billets
Blacks Sheets
Blooms
Boiler Tubes, Lapwelded, Seamless
Bolts and Nuts
Bridges—Railway, Highway, specially designed
Buildings—Steel Warehouses, Structural Steel for Buildings
Cables—Steel Hoisting and Hauling Cables
Cars—Steam Railway, Mine and Industrial Railway Cars
Car Angles
Car Wheels
Circular Steel Poles
Cold Rolled Flat Wire
Copper Rail Bonds
Copper Steel Sheets
Derricks
Drilling Machines
Drilling Rigs for Oil Wells
Duquesne Rail Joints
Electrical Sheets
Electrical Wires and Cables
Fabricated Structural Material for Bridges, Turntables, Steel Buildings, etc.
Fencing Materials—Wire Fencing, Steel Posts
Forgings
Frogs and Switches—Steam and Electric Railways
Hoops and Bands
Machine Forgings
Mine Timbers
Nails and Spikes
Nail Wire
Pig Iron
Piling—Steel Sheet
Pipe—Black and Galvanized Wrought, for Steam, Gas and Water: American or English Lapwelded Boiler Tubes. Matheson Lead Joint Pipe. Seamless Steel Tubing
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Poles—Steel Tubular
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Reinforcement for Concrete—Triangle Wire Mesh
Rivets
Rope—Wire for Mine Hoists, Derricks, Cranes, etc.
Screw Spikes
Screw Stock—Cold Drawn
Shafting
Shapes—Standard Structural
Sheet Bars
Sheets—"Apollo" Brand, Plain, Galvanized, Corrugated, Black
Skelp
Slabs
Spikes—Railway Track Spikes
Sleepers—Steel
Spring Steel
Steam Pipe and Tubes
Stove Pipe Skeebs
Switchs—Switch Stands
Tank Plates
Terne Plates
Tin Mill Products
Tin Plate—"Coke," "Charcoal" and "Terne"
Tool Steel
Towers—Steel
Triangle Mesh Concrete Reinforcement
Tubes—Gas, Water, Steam
Turntables for Light and Heavy Railway Service
Upholstery Springs
Washers
Weatherproof Insulated Telephone and Signal Wire
Wheels—Solid Wrought Steel for Steam, Electric, Mine and Industrial Railways
Wire Products—Plain, Galvanized, Bright Hard, Bright Soft, Baling and Fencing. All Classes of Coated and Uncoated for Manufacturing Purposes

The Combined Actual Annual Ingot Production of our Manufacturing Companies for the year 1920 was in excess of 19,000,000 tons.

SHANGHAI OFFICE
Union Building—The Bund and Canton Road

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OKURA & CO. (TRADING) LTD.

No. 2 Canton Road, Shanghai

President:
Baron K. Okura

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Head Office:
Ginza, Tokio

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Toyo Marine Insurance Co., Ltd.
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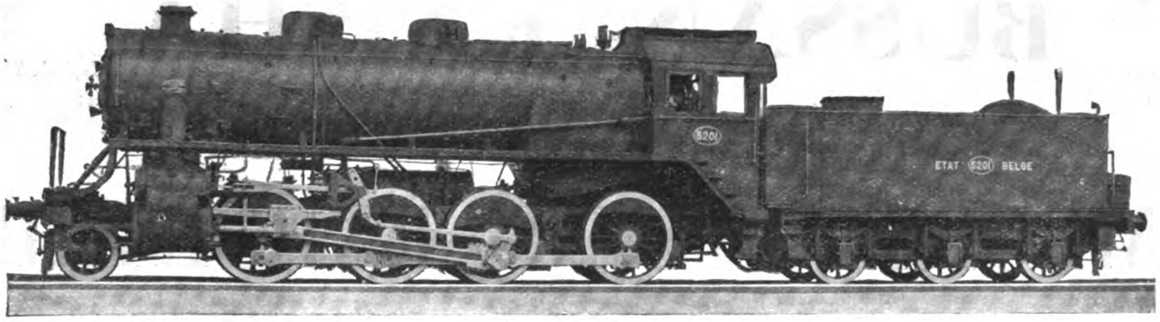
PIECE GOODS, SUGAR, ELECTRIC FITTINGS, COTTON, MACHINERY, MARINE PRODUCTS, FERTILIZERS, CEREALS AND PULSE, COAL, CHEMICALS, HIDES, FLOUR, TIMBER, YARN, METALS, OILS, WOOL, ORES, PIG IRON, ETC.

Yih Chong Wharf (Okura)

POOTUNG, SHANGHAI

AN UNUSUAL TRIBUTE



BUILT FOR THE BELGIAN GOVERNMENT

Total Weight of Engine, 188,000 pounds; Weight on Driving Wheels, 167,000 pounds; Diameter of Driving Wheels, $59\frac{7}{8}$ inches; Boiler Pressure, 200 pounds; Cylinders, 24 × 28 inches; Maximum Tractive Power, 35,000 pounds.

An unusual tribute to the locomotives supplied to the Belgian Government by the United States builders recently appeared in the Belgian official publication—"Chronique des Travaux Publics."

The following are extracts from this article:—

"The American locomotives measure up to the most optimistic expectations, inasmuch as we are using them on the Luxembourg line, the hardest division of our railways—and all are giving the best of service.

"The good quality of the American engine is proved by the significant fact that they are used in passenger service.

"The most important part of the locomotive—the boiler—is perfect.

"In a word, the American locomotives are giving entire satisfaction. They conform to the technical requirements imposed and they have to-day already given considerable service."

AMERICAN LOCOMOTIVE SALES CORPORATION

Export Sales Agents for

AMERICAN LOCOMOTIVE COMPANY

AND

MONTREAL LOCOMOTIVE WORKS, LIMITED

30 CHURCH STREET, NEW YORK, U. S. A.

CABLE ADDRESS: "LOCOMOTIVE," NEW YORK

RESIDENT TECHNICAL REPRESENTATIVE

CHINA: PEKING—F. M. Titus, International Banking Corporation

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Cable Address: "MITSUI"

LIMITED

Capital: Yen 100,000,000
Reserve: „ 30,000,000

MITSUI & CO., LTD. (IN EUROPE AND AMERICA)

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Head Office: TOKYO, JAPAN

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SHIPBUILDERS, ENGINEERS AND REPAIRERS SHIPYARDS AND DRYDOCKS AT TAMA, OKAYMA, JAPAN, For Construction and Repairing

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Raw Silk and Silk Textiles, Coal, Lumber, Rice, Seeds, Beans, Flour, and Other Cereals, Sugar, Copper and other Metals, Vegetable and Wood Oils, Camphor, Matches, Fertilizers, Paper, Canned Foods, Fish Products, Tea, Sulphur, Cement, etc., etc.

IMPORT.

Machinery and Tools, Ships, Steel and Iron, Locomotives, Rails and other R. R. Equipment, Sugar, Rice, Wool, Phosphate, Sulphate of Ammonia, Nitrate of Soda, Rubber, Dyes, Drugs and Chemicals, Jute and Gunnies, Flax and Hemp, Wheat, Seeds, and other Cereals, Bean Cakes, Lumber, etc., etc.

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Bucyrus Co.
California National Supply Co.
De La Vergne Machine Co.
General Electric Co.
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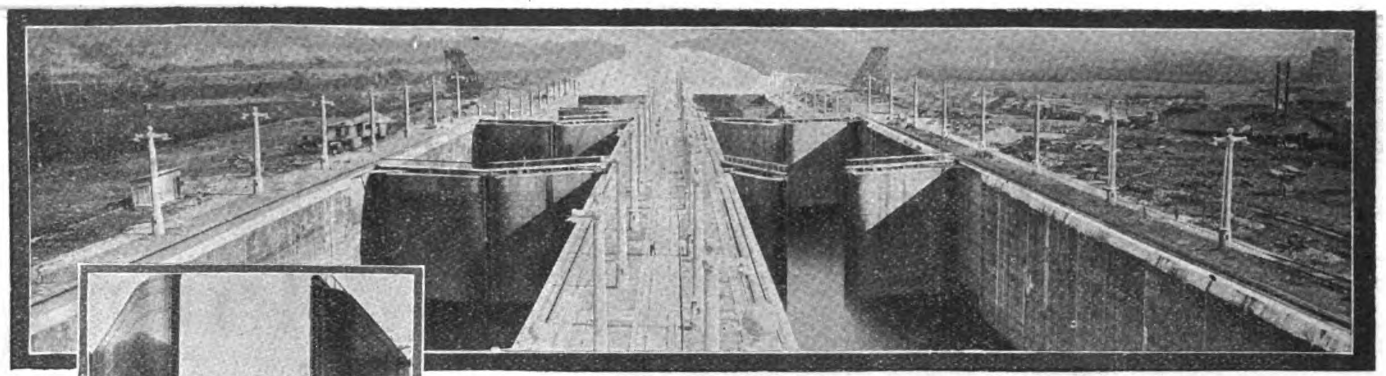
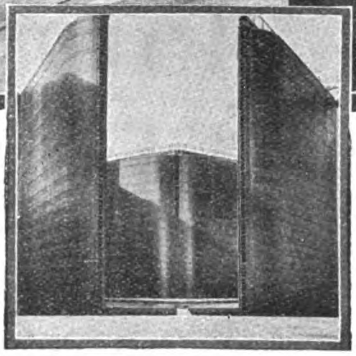
Platt Brothers & Co., Ltd.
Ruston & Hornsby, Ltd., etc. etc.

Also, AGENTS IN JAPAN, ORIENT, and INDIA for Well-known Japanese Insurance Cos.





Lock Gates Panama Canal.

ONE OF OUR BIG JOBS

GOVERNMENTS make no mistakes when contracting for huge construction jobs such as the Lock Gates of Panama. We are proud of our big jobs, because we could not get the big jobs unless we had built up a reputation for doing the little ones well.

We manufacture everything in steel construction.

Our capacity is 400,000 tons per year.

Cable or write us on your next big or little job.

McClintic-Marshall Products Company

WORKS: PITTSBURGH, U. S. A.

Foreign Contract Dept., 50 Church Street, NEW YORK

Cable Address: "Macmarsh" NEW YORK

PARIS, *Robert McKean*, 8, Rue Edouard VII. HAVANA, Obrapio y Ignacio

Madrid, Hispano-American Corporation

We Design, Manufacture and Erect
Steel Industrial Plants
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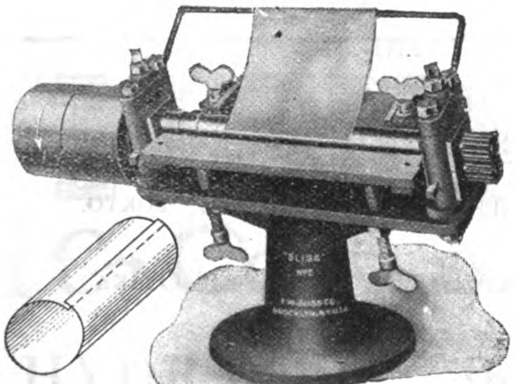
Ore Bridges
Etc.
McClintic-Marshall
Annual Capacity 400,000 Tons

McClintic-Marshall
Steel Construction

FROM THE TIN PLATE TO THE FINISHED CAN

THE FORMER



No. 2—"Bliss" Power Former

SHEAR
This cuts the tin plate into strips.

PRESS
This blanks out tops and bottoms.

ROLL FORMER
This rolls the bodies to cylindrical shape.

SOLDERING FRAME and CYLINDER
This solders the side seams.

After shearing out the strips for body cylinders (see second advertisement of this series), the strips are rolled so as to form perfect can bodies (machine and operation shown at left). This operation is performed by the "BLISS" POWER FORMER. This machine has steel rolls and gauges, cut gears, and composition metal bearings or boxes. It rolls a true circular cylinder with perfect laps on edges and is so constructed that the work drops out automatically at a very rapid rate.

Do not overlook this series of advertisements, and, especially, watch for the next one illustrating the fourth operation.

"Bliss" Can Making Machinery (one series shown at right) is suitable for making cans of all kinds, and tin packages for every purpose. **With your inquiries always send samples and state daily output desired.**

FLANGER
This flanges both ends of can bodies.

DOUBLE SEAMER
This attaches bottoms and tops.

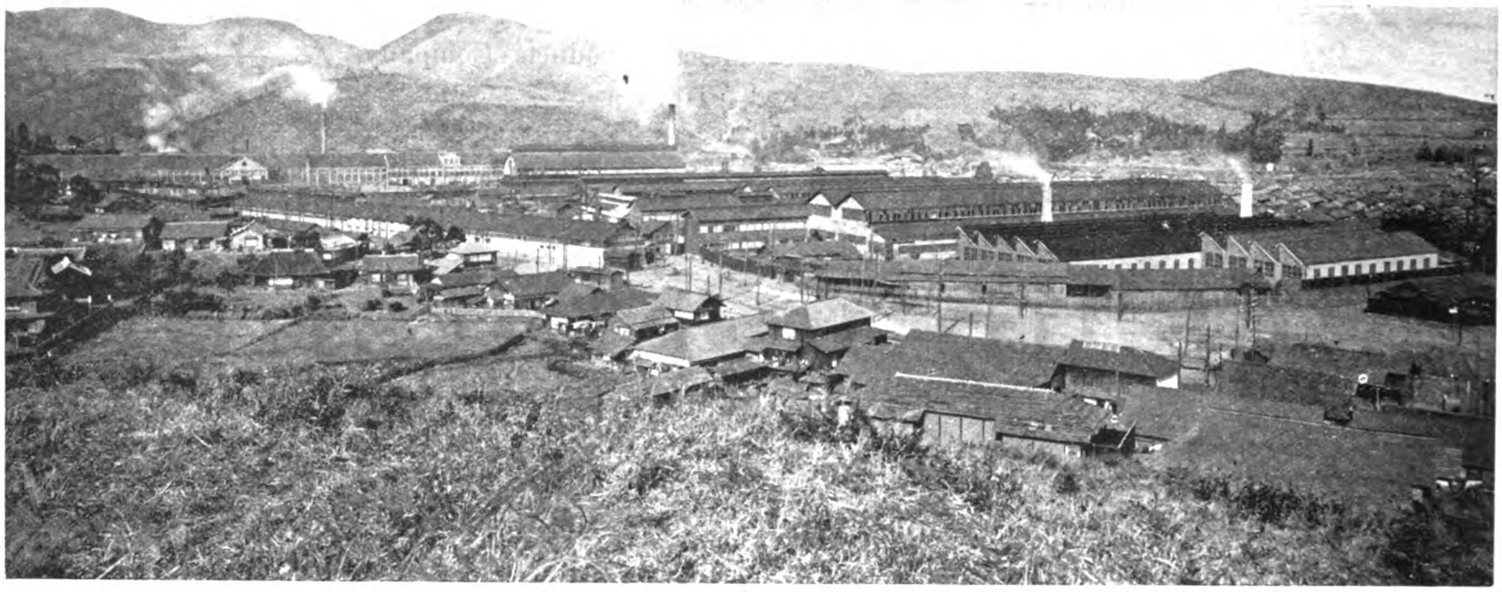
E. W. BLISS COMPANY

22 JOHN ST., BROOKLYN, N.Y., U.S.A.

Presses, Dies and Machinery for the Sheet Metal Industry in general. Complete plants for the manufacture of Metal Boxes, Sanitary Cans of all shapes and sizes, Kitchen Utensils, Petroleum Cans, etc. Complete automatic equipment for making tin cans from tin plate in one continuous operation.

London, England—Pocock St., Blackfriars Road **Paris, France—100 Boulevard Victor Hugo, St. Ouen**

HIDACHI ENGINEERING WORKS



GENERAL VIEW OF HIDACHI ENGINEERING WORKS

Location of Plant:

SUKEGAWA, IBARAKI PREFECTURE, JAPAN.

Sales Departments:

KUHARA MINING COMPANY OFFICES, 1 ITCHOME, YAESUCHO, KOJIMACHI-KU, TOKYO.

KUHARA MINING COMPANY OFFICES, 90 NICHOME, KITAHAMA, HIGASHI-KU, OSAKA.

Articles Manufactured:

DYNAMOS, ELECTRIC MOTORS, TRANSFORMERS, DISTRIBUTOR PLATES, TURBINE PUMPS, CRANES, WINCHES, AND VARIOUS KINDS OF HYDRAULIC WHEELS.

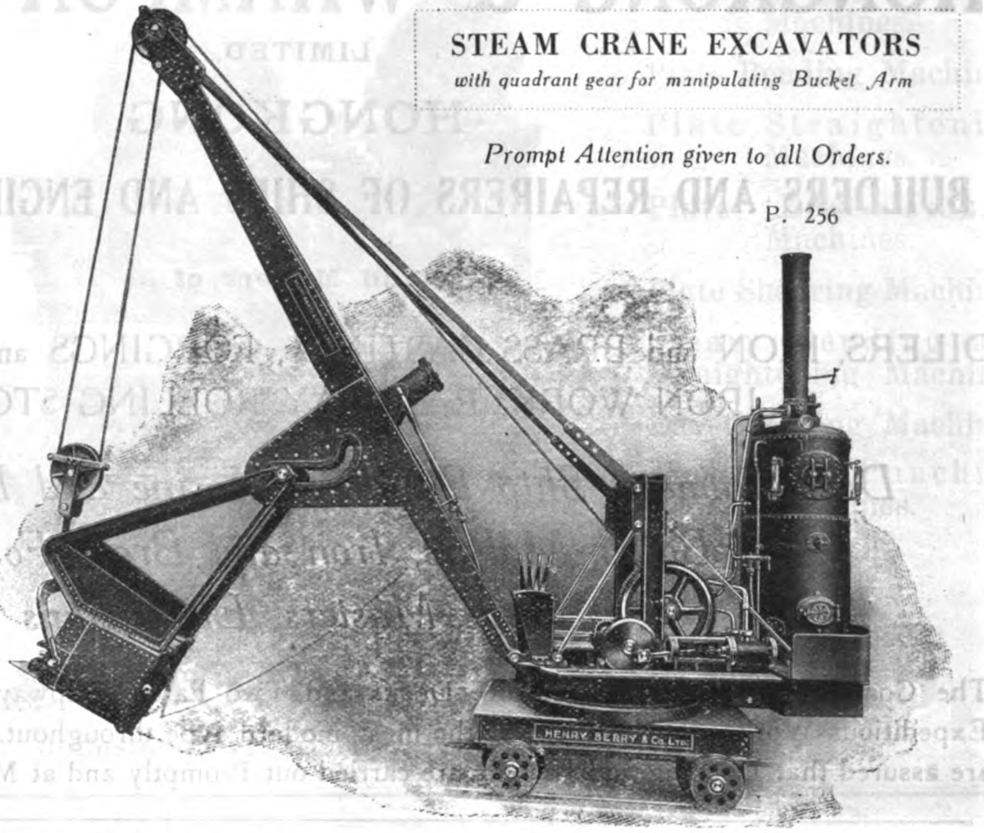
Also Agents for Hoden Oil, Used for Transformers.

Quick Work

This is one of the Berry

8-TON

Steam Driven EXCAVATORS



with a working output per ten hour day of 420 cubic yards in hard clay or 850 in sand. Invaluable for every kind of Mining, Canal and Railway Building Work.

We also supply Shipyards, Boilermakers and Steel Works with Plant of all Kinds.

London Office: 38 Victoria Street, Westminster, S.W. 1.
Indian Agents: Messrs. Burn & Company, Calcutta.

HENRY BERRY
& Company Limited.

HYDRAULIC ENGINEERING SPECIALISTS

Codes: A. 1. 5th Edition A.B.C. Engineering

LEEDS, ENGLAND

Codes: Everybody's Pocket Code Marconi International

THE

HONGKONG & WHAMPOA DOCK CO.

LIMITED,

HONGKONG

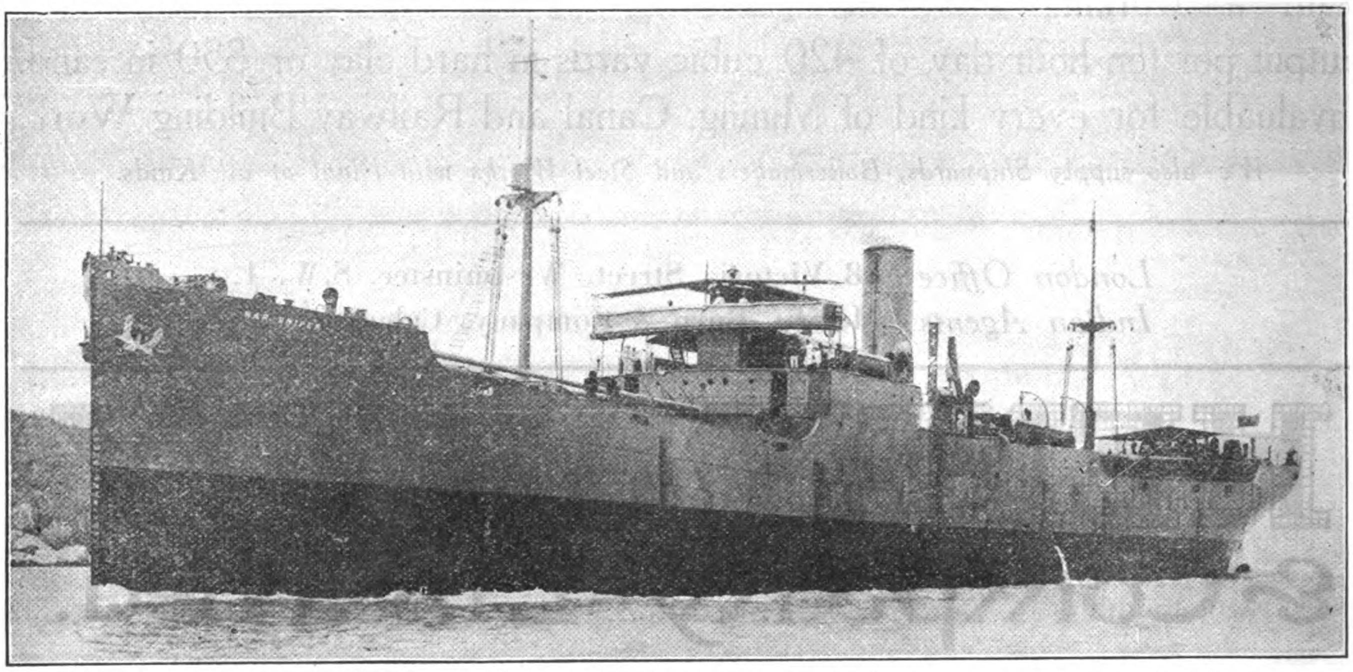
BUILDERS AND REPAIRERS OF SHIPS AND ENGINES OF ALL KINDS

and Makers of

BOILERS, IRON and BRASS CASTINGS, FORGINGS and CONSTRUCTIONAL IRON WORK, RAILWAY ROLLING STOCK, Etc.

Dock Owners, Ship Builders, Marine and Land Engineers, Boiler Makers, Iron and Brass Founders, Forge Masters, Electricians

The Company possesses Six Granite Docks and Two Patent Slipways and these are Equipped for Expeditious Work. The Plant is of the most modern type throughout. Ship Owners and Captains are assured that Docking and Repairs are carried out Promptly and at Moderate Charges.



S.S. "*WAR SNIPER*," 8,200 tons d.w.—5,175 tons gross. Built and engined by The Hongkong & Whampoa Dock Co., Ltd. to the order of the British Government.

Address Enquiries to the Chief Manager, R. M. DYER, B.Sc., M.I.N.A., Kowloon Docks, Hongkong

HEAD OFFICE: KOWLOON
TELEPHONE No. 55 K.

TOWN OFFICE: QUEEN'S BUILDINGS
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TELEGRAPHIC ADDRESS: "MANIFESTO" HONGKONG

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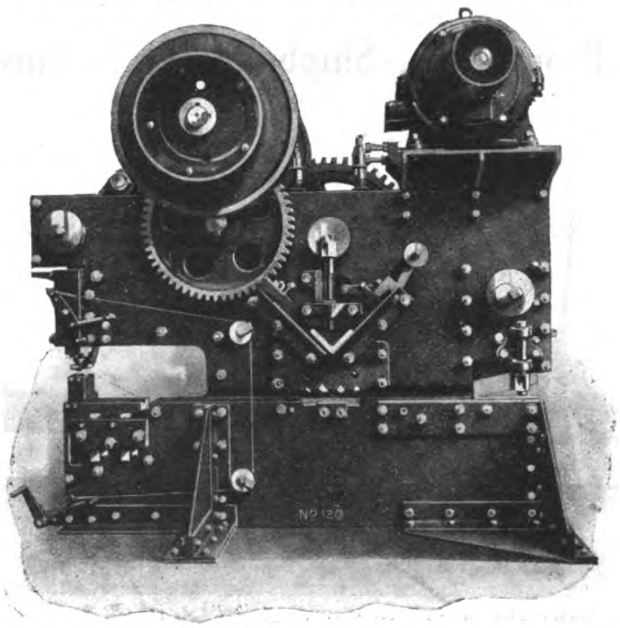

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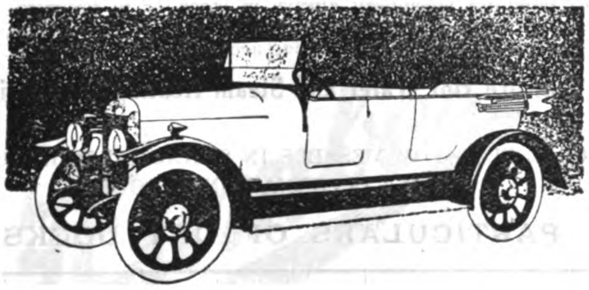

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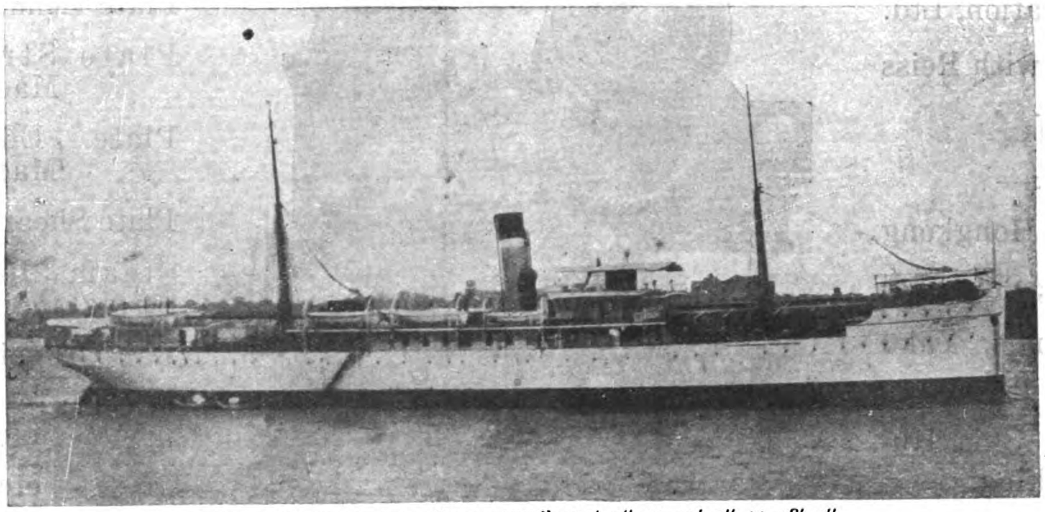

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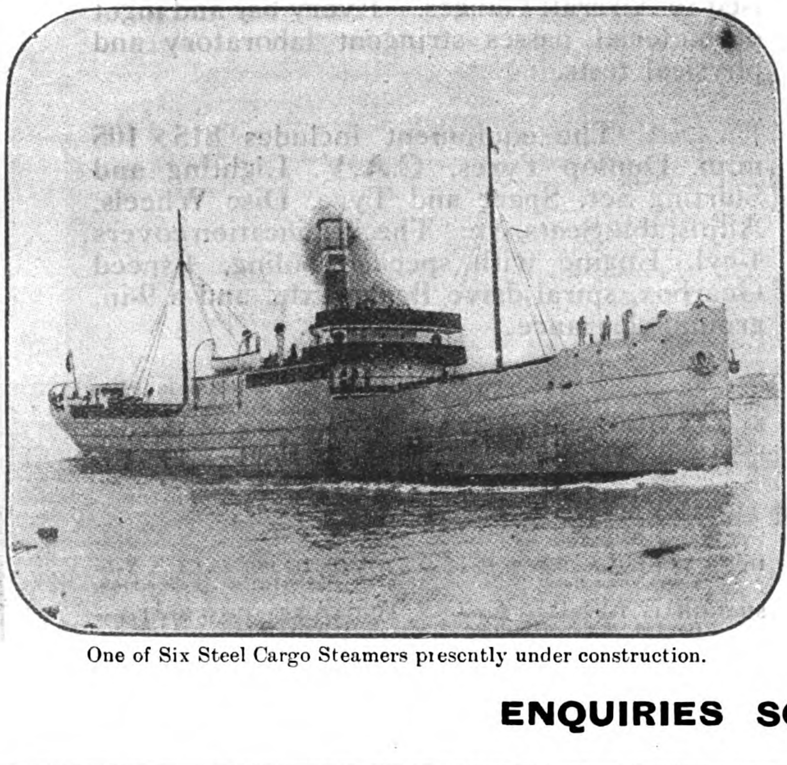

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New Dock	450 ,,	74 ,,	21 ,,
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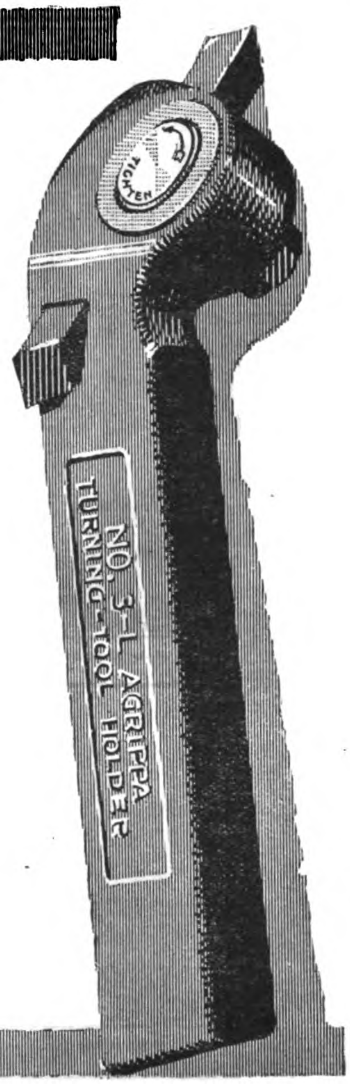

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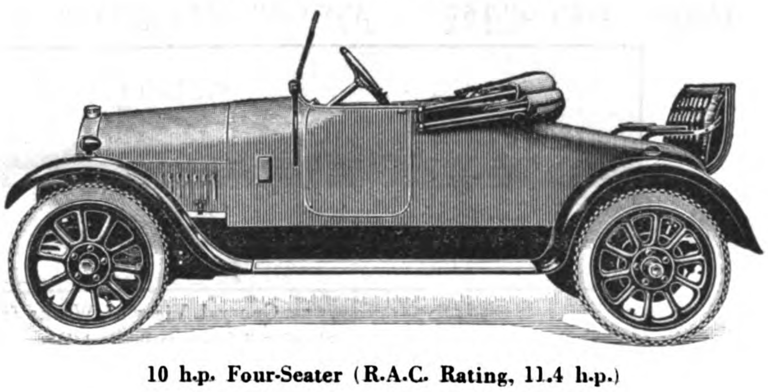

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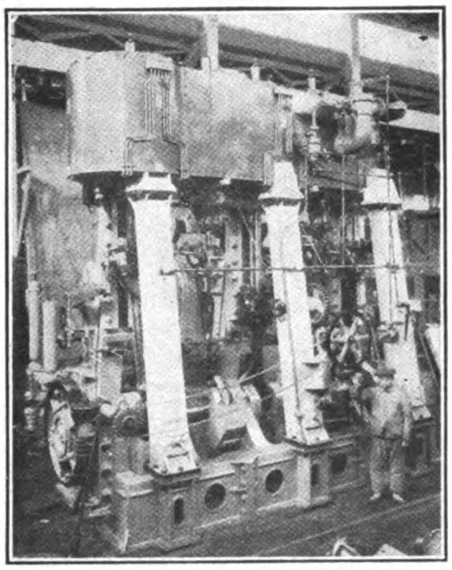

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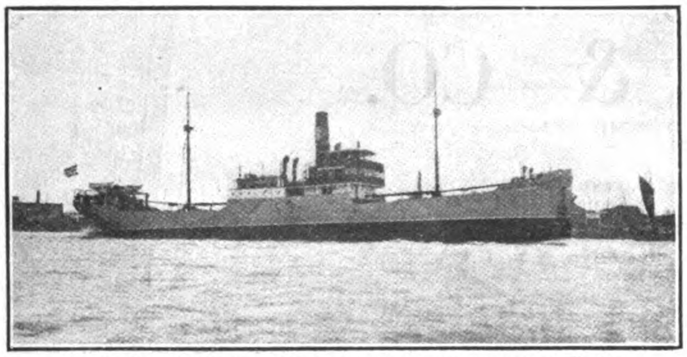

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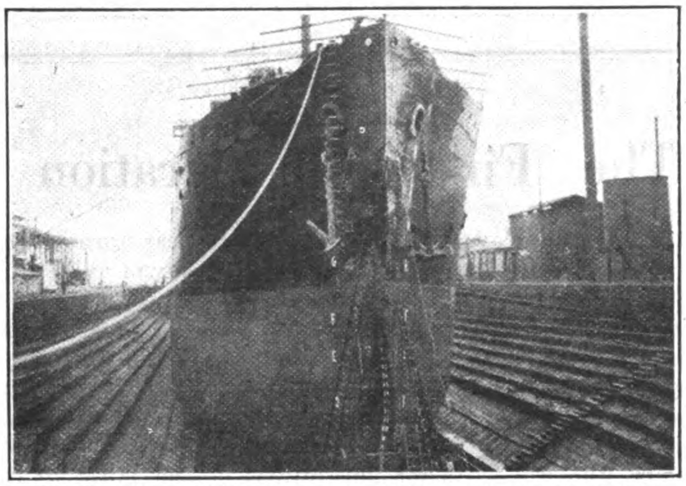

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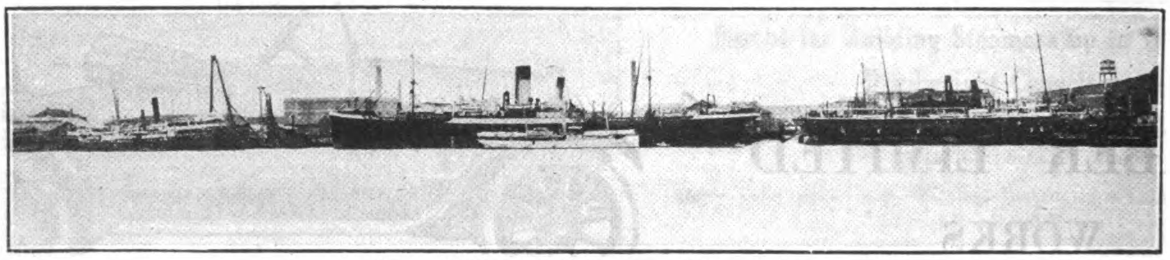

General View of Works from River Side

Showing 8 Steamers Berthed Alongside Undergoing Repairs.

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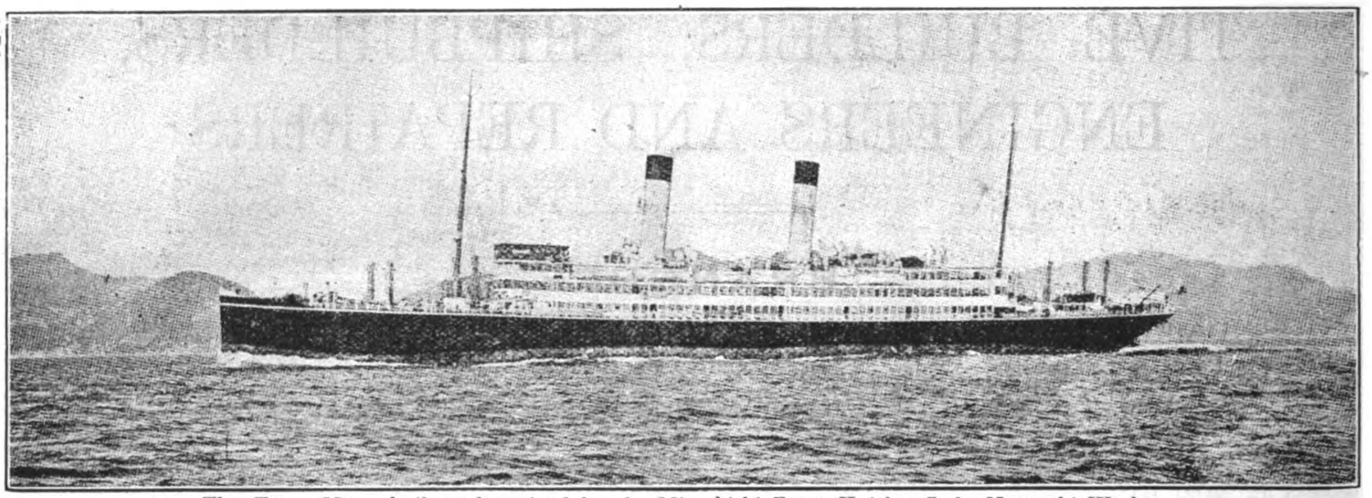

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Width of Entrance on Top	66	,,
,, ,, ,, ,, Bottom	53	,,
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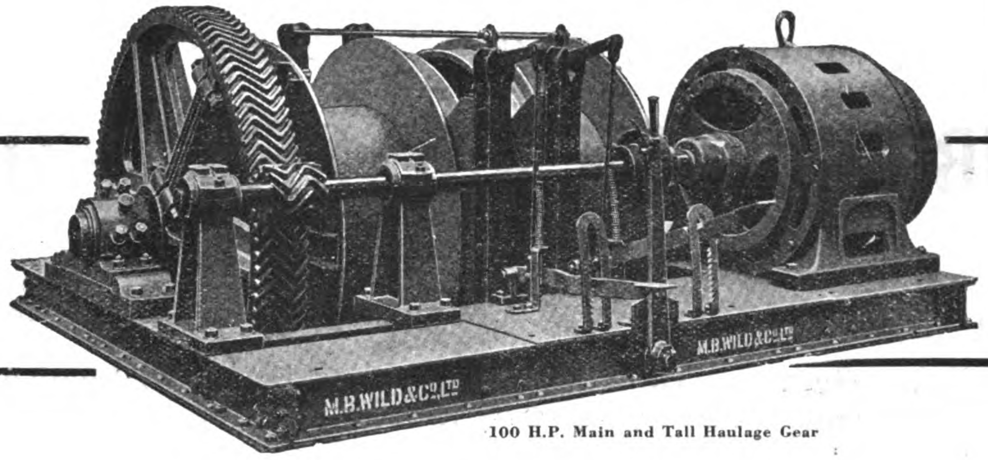

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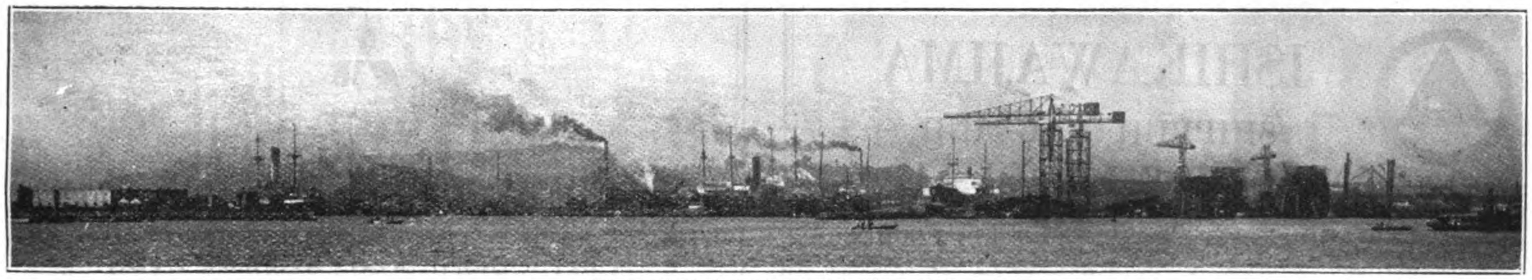

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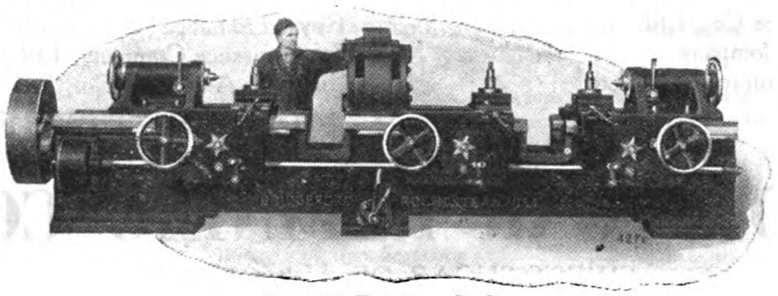

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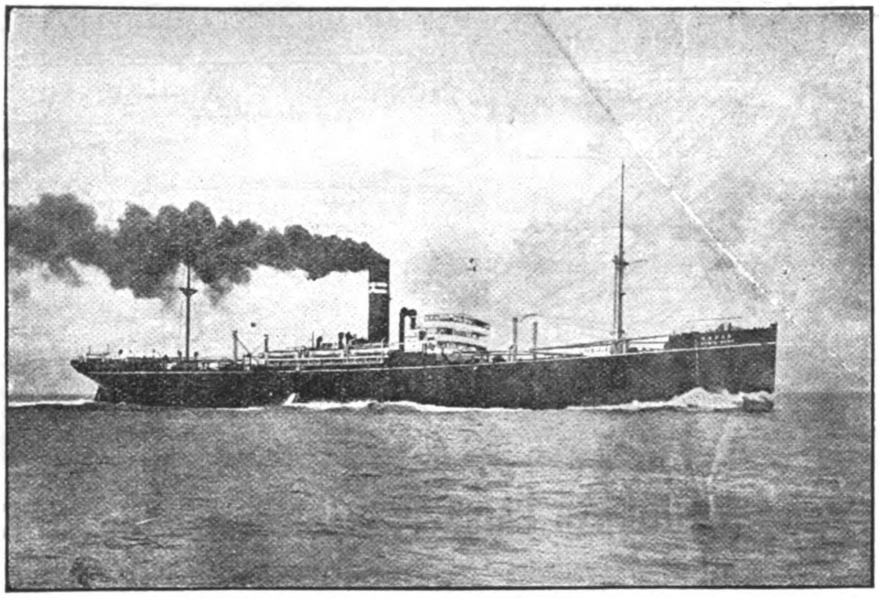

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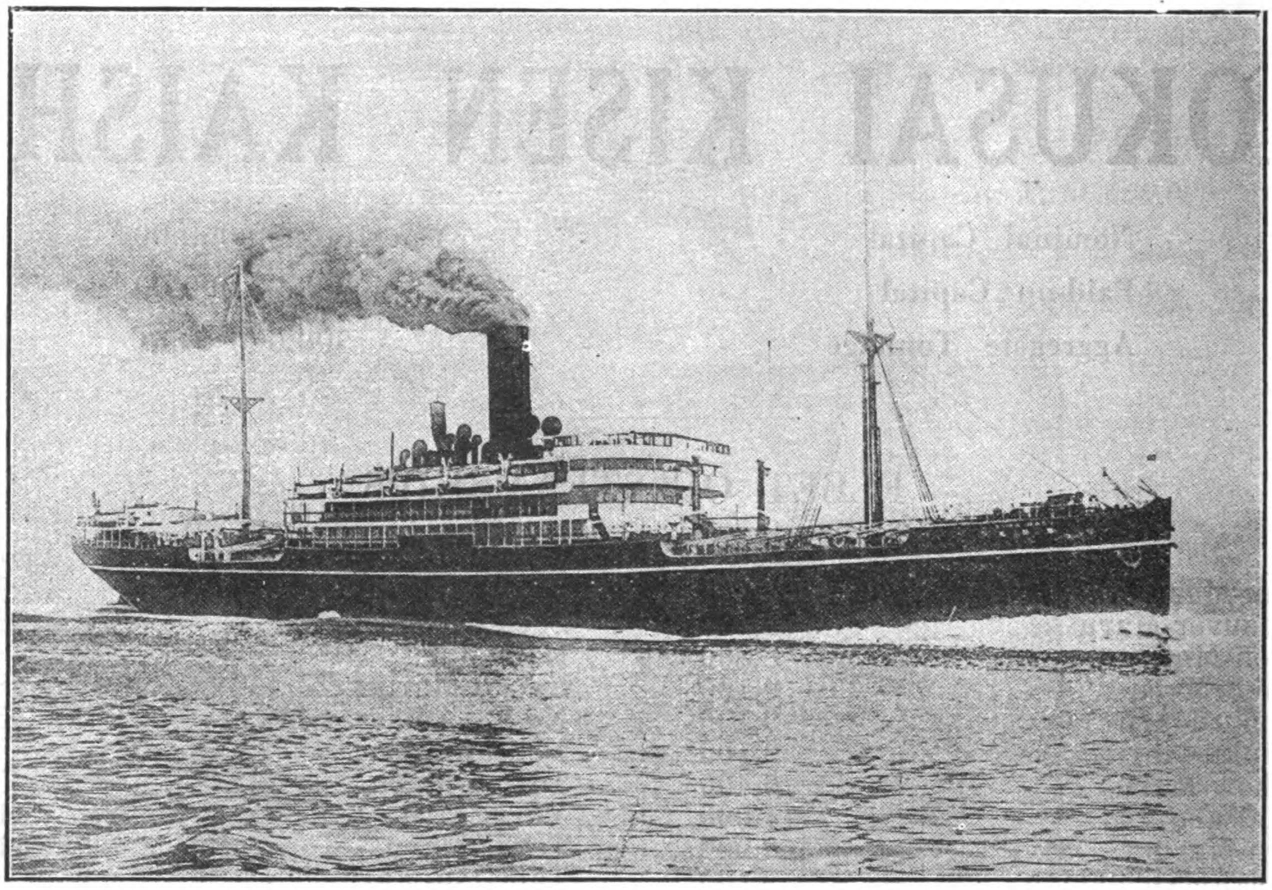

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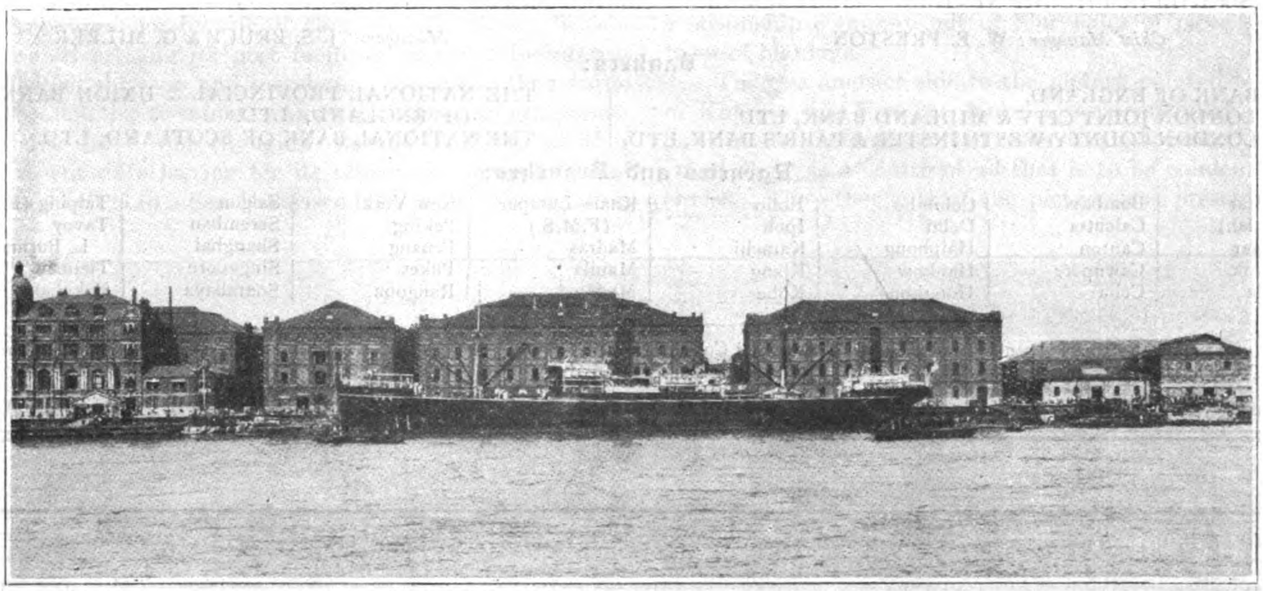

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The Far Eastern Review

ENGINEERING FINANCE COMMERCE

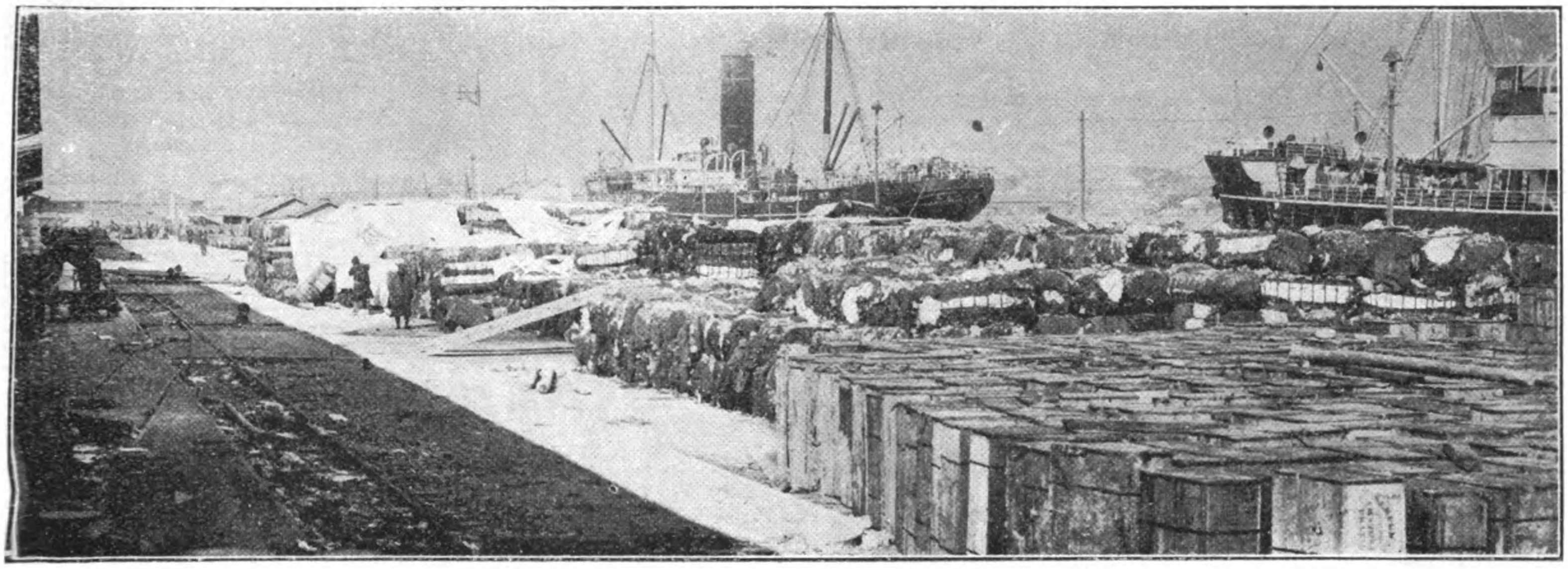
Vol. XVII SHANGHAI, SEPTEMBER, 1921 No. 9

THE PORT OF KOBE

By Geo. Bronson Rea

JAPANESE newspapers report that the authorities of Kobe are conducting a campaign in Great Britain for advertising its port facilities in order to interest British shippers and merchants in routing their cargo through this terminal. As we read the short article outlining the above facts, our thoughts wander back to another campaign of recent date having for its object the discrediting of the port, which resulted in a San Francisco foreign trade association was recently sentenced to three years' imprisonment for swindling a steamship company out of four bales of piece goods and threes bales of blankets.

There is another side to the picture painted by the detractors of Kobe, a side that the Kobe newspapers might with propriety have invited attention to in order to show that their port did not stand alone as a centre of all that is to be condemned in shipping circles. The other side of the picture was presented by the *New*



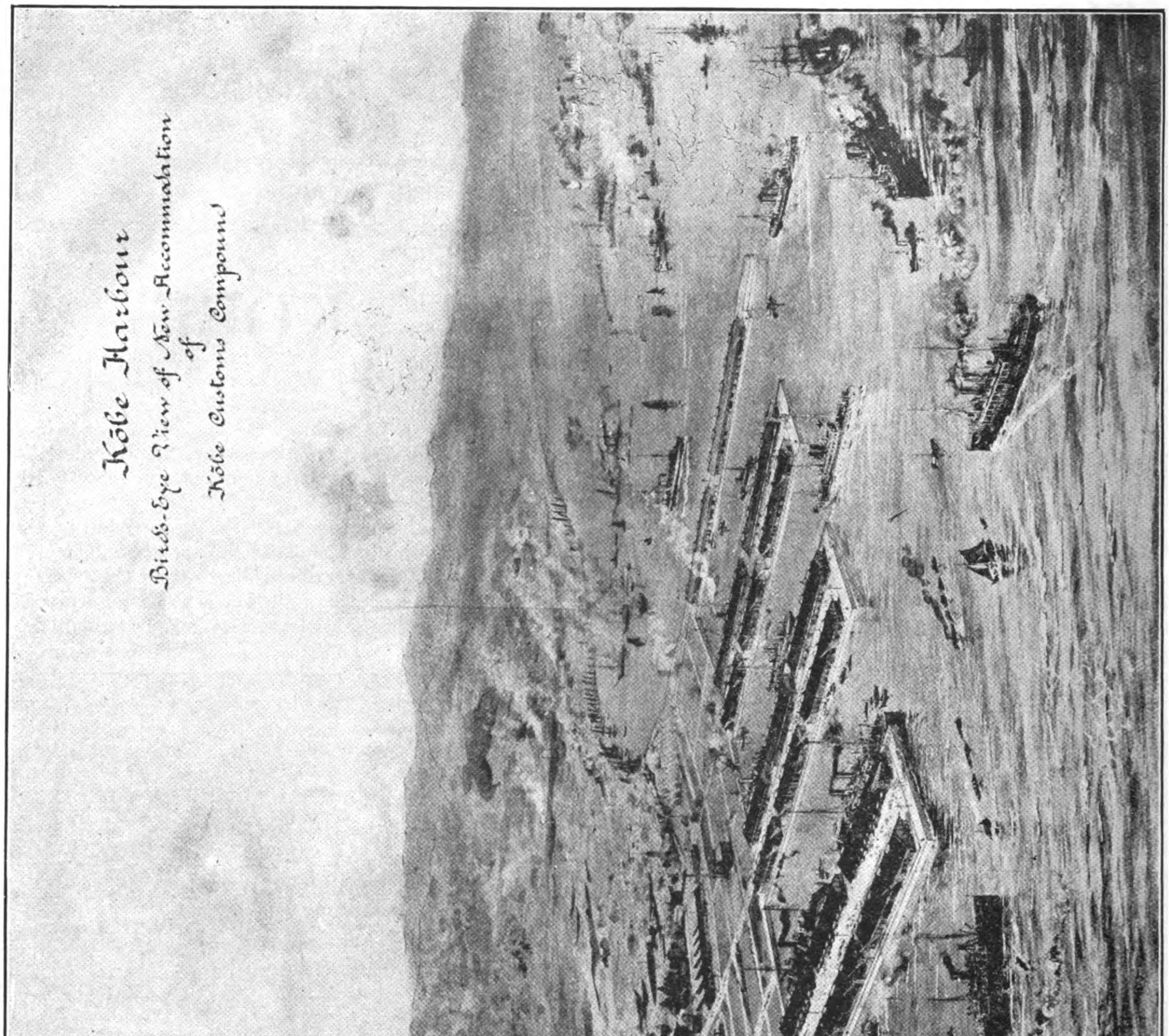
Congestion of Cargo at No. 4 Pier, Kobe, in November 1918. (Reproduced from Ports of the Orient Number of "The Far Eastern Review," February 1st, 1919

passing a resolution to boycott Kobe (boycotts were then the fashion) and culminated in an official denunciation of the port in a letter directed to the chairman of the United States shipping board by the American secretary of commerce. It was a one-sided campaign, waged through confidential memoranda and reports, with no opportunity for the Japanese authorities to know what was going on, or make their side of the case clear, and apply necessary remedies. The complaints were summed up in an indictment presented by a San Francisco foreign trade association, which charged that shipments were delayed, tampered with, pilfered, damaged and destroyed, and that cargoes were held up so that copies of machines could be made in order that the Japanese merchant could undersell the shipper, etc.

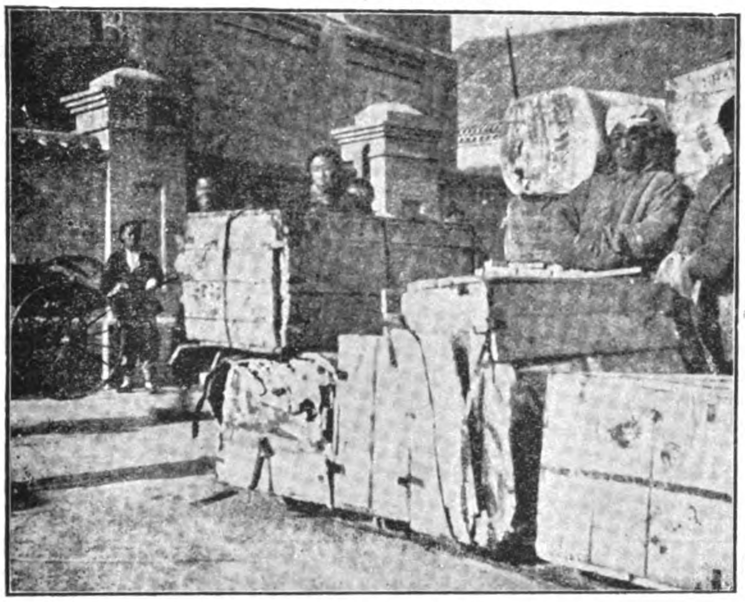
Our interest in this matter has been revived by reading the [illegible]rt of the Madras port trust, which, by proper police protection [illegible] energetic prosecution of cargo thieves, has reduced losses to a [illegible]imum. Further interest in the subject arises from a perusal of [illegible]port dealing with the same methods for the protection of cargo [illegible] Hongkong authorities, alive to the necessity of drastic action [illegible] find that one festive Celestial by the name of Ma Ying-lung

York World of May 9th, last year, in a full page illustration depicting the methods of dock thieves, whose "activities had become so extensive that insurance rates had been quadrupled, compelling the American Express Company to issue a special warning to shippers." One gang alone was accused of stealing $500,000 in six months. At the same time that the campaign was on to discredit Kobe, the greatest gang of robbers that ever existed in a civilized community were taking their toll of Japanese goods exported to America. In 1919, the United States imported 44,816,918 pounds of raw silk, valued at $329,338,918. Highwaymen, dock-rats, loft thieves, automobile bandits and other well-organized gentry of the same brotherhood, took their toll of this valuable merchandise to the value of no less than $5,000,000. To find a parallel to the operation of these gangs under the shadow of the statue of Liberty, we must go back to the days of Jesse James and other bold knights of the road. The New York police records disclose that the good old American cognomens of the mask and revolver have disappeared and the new bandit hierachy masquerades under such Semetic and Sicilian *aliases* as Rafaelito the Angel-Faced King of the Silk Swipers, Kid Cohenski, the Crepe Cracksmen, Bruno, the Brocade

KOBE HARBOR



NEW WHARFAGE ACCOMMODATION



How Foreign Goods often Arrive in China, direct, without Transhipping at Kobe

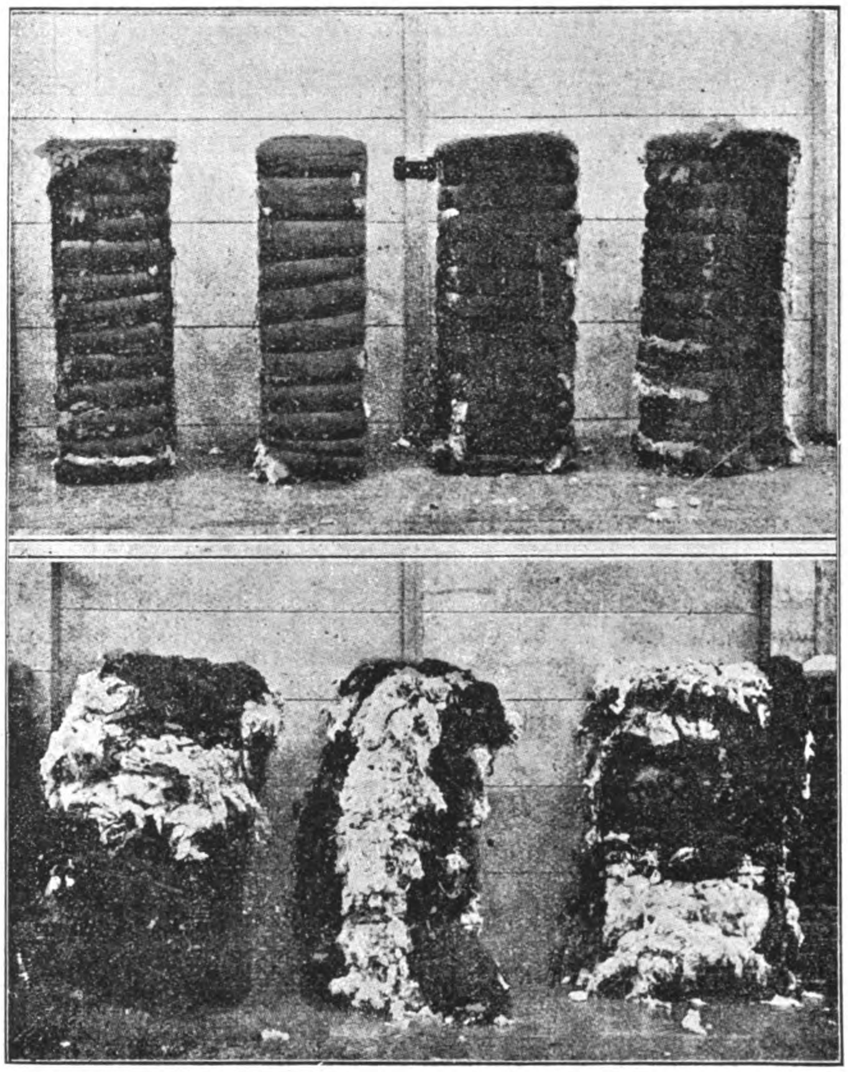
Bandit, or Aniline Ike, the head of the Dye House Trust, etc. The new kings of the road sweep through the pages of the up-to-date dime novel seated in the soft luxurious cushions of the most expensive make of American automobiles, defying the armed guards of the silk caravans as they motor swiftly along the highways leading from Patterson and the silk towns of New Jersey to the Hudson River terminals of the steamships. Anyone who is interested in following the ramifications of this highly organized system of modern brigandage which specializes in taking toll of the principal product of Japan, will find all the details in an article entitled "Queen Silk," published in the *Saturday Evening Post* of June 26th, 1920.

Simultaneous with this *expose* of silk thefts and warning from the American Express Company, there was re-published in the New York newspapers, a dispatch to *The Times* of London dated May 9th, from Sydney, New South Wales, "revealing the existence of a gang of men with world-wide ramifications who are engaged in stealing from cargoes on their way to Australia from English and American ports. The pilfering has taken place prior to shipment from the points of origin, during transmission, and after arrival at destination. At Sydney over $75,000 worth of goods have been stolen since Christmas time and other ports have suffered in a similar manner. As an indication of the extent to which the thieves are carrying out their work it may be mentioned that a piano shipped from London was taken from the shipping case and the case filled with bricks. Other cases supposedly containing costumes of silk goods arrived at their destination stuffed with newspapers, while boxes of merchandise from New York were found to be filled with shavings. An American sea captain remarked when the situation was brought to his attention that he was pleased to bring his vessel into port with his funnels intact."

It is a remarkable fact that these vessels did not stop at Kobe, clearing direct for Australian ports from London, New York or San Francisco, and if read in the proper spirit, the above holds out hopes that the pilferings charged against the port of Kobe may also have taken place before the cargo was delivered there.

At the same time that the port authorities of Kobe were being charged with maliciously delaying foreign [illegible] and giving quick dispatch to vessels flying the Japanese flag, steamers loading for the Far East at the port of New York were compelled to sail with only a quarter of their cargo because of the inability of the American railways to deliver the freight on time. Hardly a port in the United States escaped serious dock and labor strikes, and in 1919-20 the railways were tied up half the time. There were not cars enough for the domestic needs of the nation. If Japan or any other country had been so unfortunate as to have to route their merchandise through an American port for transhipment to South America or the Antilles, the conditions prevailing last year might well have given just cause for accusations similar to those raised against the port of Kobe.

Faulty packing is the root of many evils. It constitutes the direct temptation for stevedores and cargo handlers to extract goods from the bales or boxes as they pass through their hands. Damages to American shipments may have been the fault of Japanese handling, again it may due to faulty packing. The same complaints that were raised against the port of Kobe were raised against other foreign ports. We hear of faulty packing on all sides. It is the father of thieves, the lure of the dock-rat in all ports of the world. Freight and cargo handling methods the world over are hardly conducive to the safe delivery or transhipment of improperly packed merchandise. The port of Kobe had no monopoly on the smashing of cargo. If conditions were reversed, and it became the fashion to incite enmity against the United States because of similar methods in handling cargo, etc., other nations might, in turn, be justified in accusing Americans of trying to damage their trade while forced to use our ports during the war as points of transhipment. It was impossible for several months to get our transportation problems solved. The railway yards were choked with



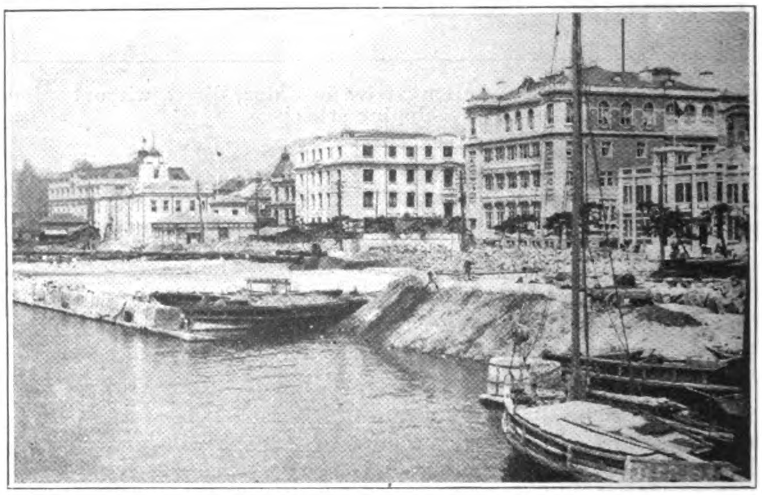
State in which Cotton often Arrives in the Far East. The top picture shows Bombay Cotton—the bottom another Foreign Consignment

cars loaded with perishable and valuable freight, exposed for weeks and months to the depredations of organized bands of robbers. There may have been, and undoubtedly were, many instances where the port authorities during war-time earned the censure of the foreign shipper, especially American firms in China, who, at the outset of the war, were compelled to use Japanese ships to transport their merchandise across the Pacific, and see them transhipped for China at Kobe. The natural consequence was a glut of cargo, which swamped the storage capacity of the port, taxing its facilities to the utmost. Everybody was clamoring for their goods. That the Japanese, at times, gave preference to their own merchandise, is proof that human nature is the same the world over. There are probably as many instances where the same charges could be duplicated against American, British and French ports during and immediately after the war. We saw the same thing in ports and on Japanese could copy the goods and undersell the American. The facts surrounding the case were simply that the port of Yokohama was glutted, sheds, warehouses and lighters filled to the limit with goods which could not be moved. The trunk in question laid on a lighter for over six weeks, there being no space on the docks on which to unload.

It was the same in Kobe, only worse. Call it what we will, it was simply one proof that Japan went through the same experience that every other country did during the war, and the strain brought about a breakdown in the management of the port of Kobe, and with broken cargo, faulty packing, and all the other drawbacks to normal conditions, the field was wide open for the dock-rats and others who preyed on commerce at this time of great world stress.

If we listen to the charges brought against the Kobe authorities by those who suffered because of these delays in China, we ought in

THE PORT OF KOBE



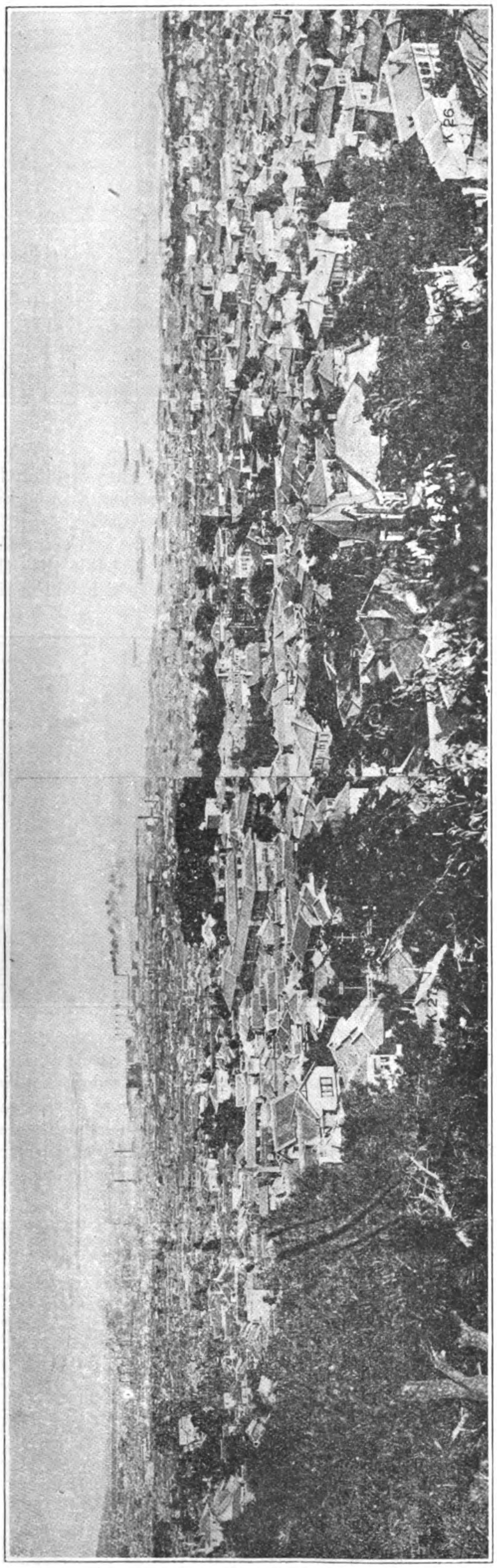
the railways of Europe, where every preference was given to national shippers, while the cargo of foreigners was delayed, side tracked and lost.

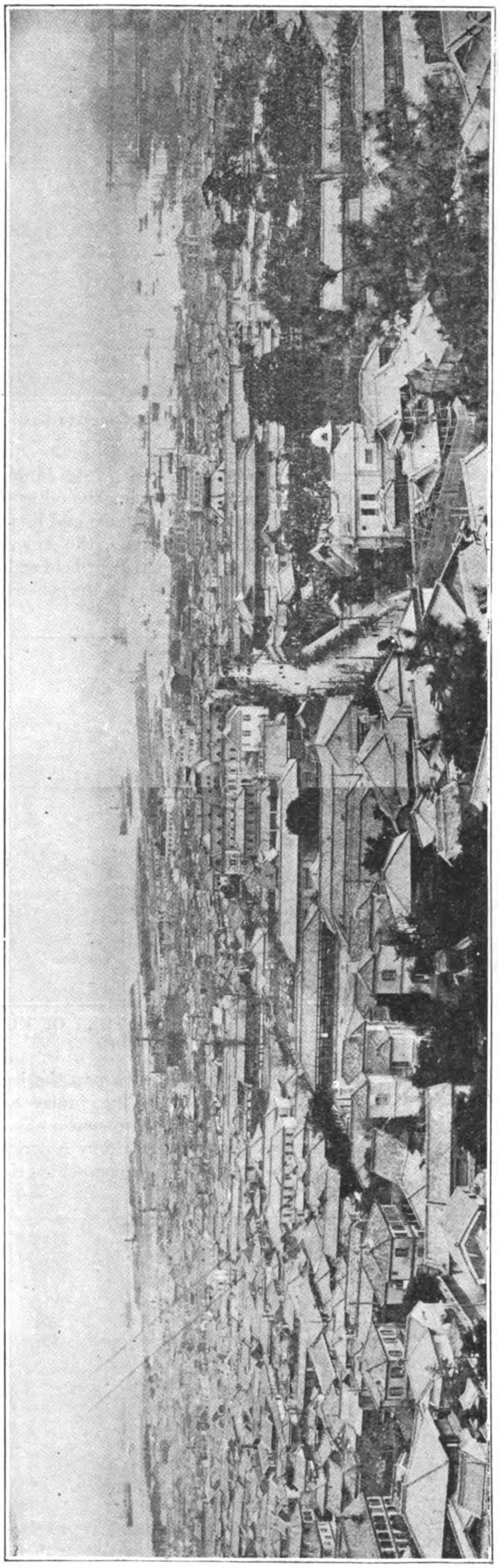
There is no way that we can indict a whole nation, and to hold that the delays, pilferings, breakage and other damages to cargo at the overcrowded port of Kobe were traceable to a set purpose on the part of the Japanese authorities to intentionally discriminate against American trade is stretching the campaign against Japan too far. On my arrival at Yokohama in August of last year, I telegraphed to Shanghai for a trunk containing summer wearing apparel. It arrived in one week on an Y. Y. K. steamer. The customs brokers in Yokohama were just three months getting that trunk through the customs. If it had been a case of goods shipped to an American firm in Yokohama it would have gone on record in some confidential report as a specific instance of Japanese discrimination or, as proof that it was delayed in order that the all fairness look at the other side of the picture, and keep in mind what Judge Thomas Burke of Seattle had to say not long ago:

"Seattle should not forget that when our own government failed to give us ships, to give us world commerce, when American companies were operating from other ports on this coast that it was a Japanese steamship line which acted as handmaid to our commerce. IT PUT US ON THE WORLD'S MAP."

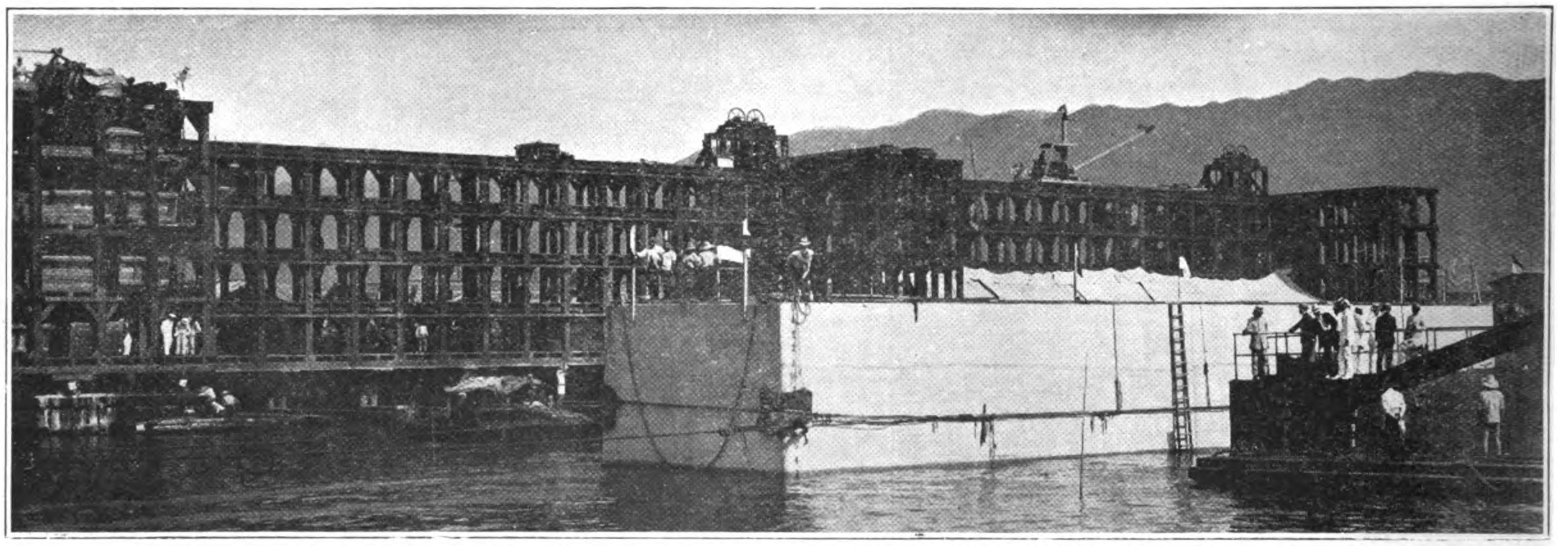
The testimony of Judge Burke, backed by the full weight of the Seattle chamber of commerce and the influence of the great trans-continental railway which connects with the Japanese liners, should weigh in the balance against the charges brought against the port of Kobe by other Americans in this part of the world.

Crossing the Pacific last year, I discussed this question with an American merchant who, for a time, practically dominated the vegetable oil imports into the United States. I recall how he gra-





PANORAMIC VIEWS OF THE PORT OF KOBE

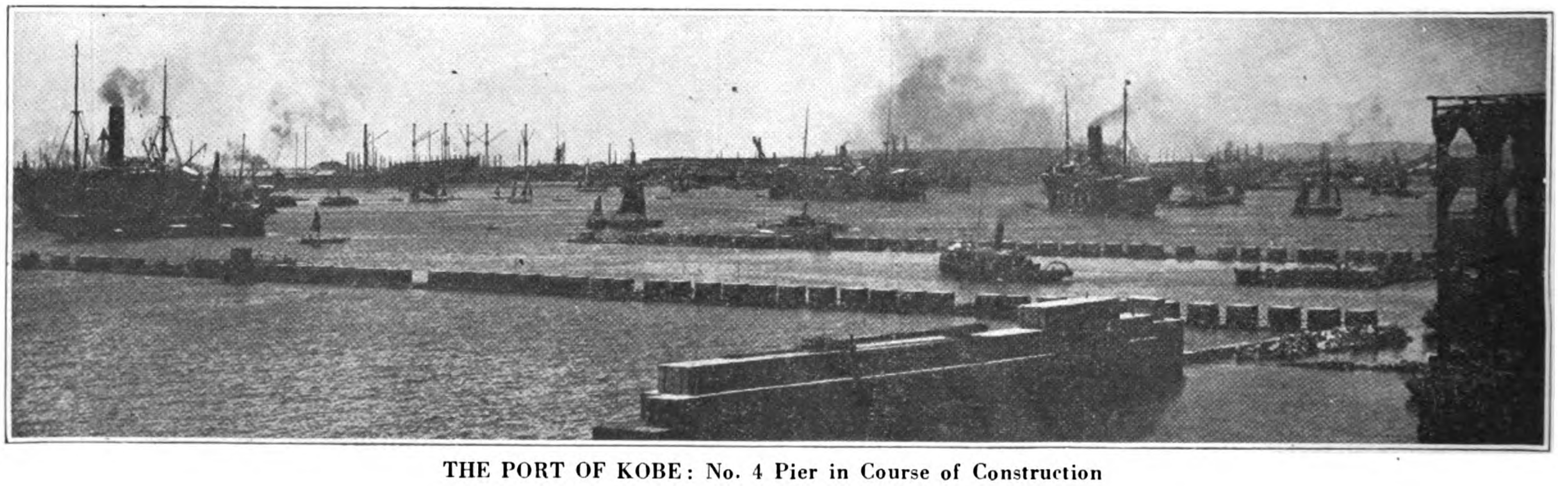


THE PORT OF KOBE: Ferro-Concrete Cassion, 2,300 tons deadweight used in Kobe Pier Construction

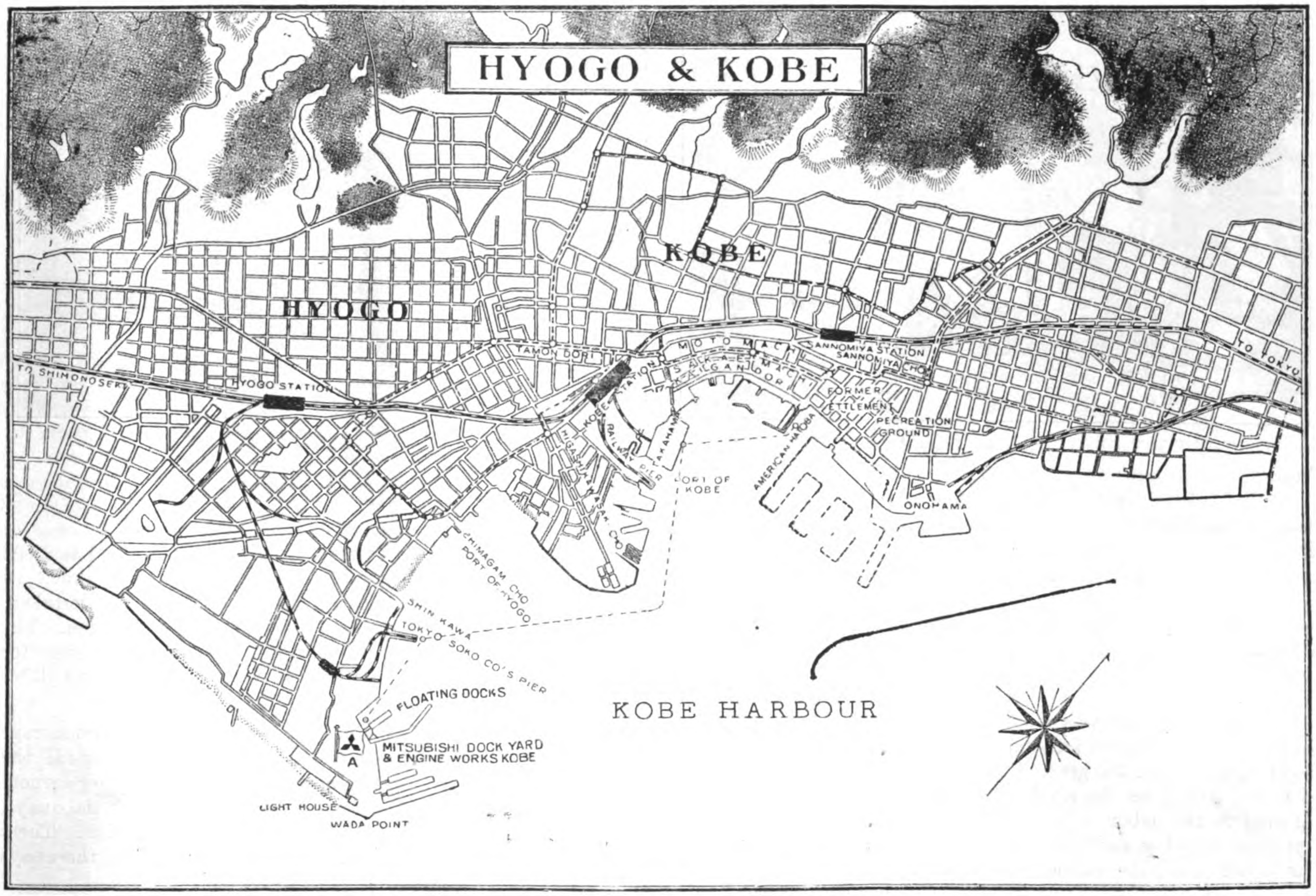
phically described the great losses in leakage arising from improper containers, which was rectified, in part, by shipping the oil in bulk in tank steamers, and how a great part of the leakage and loss was due to improper packing and unloading at Seattle, the American port of discharge, where, he declared, the wharf floor held at least a quarter of an inch of oil. Here, the boot was on the other foot, and the Japanese shipper of soya bean oil had to pay the heavy penalty because of faulty packing aggravated by clumsy cargo handling. I do not recall ever reading in the Japanese press any accusation that their merchants were being penalized by Americans, who deliberately damaged their cargo, in order to compel vegetable oil shipments to pass through American firms. They certainly had as much justification for making such an accusation, as Americans had in charging them with similar practices in Kobe.

The Japanese authorities are spending millions for the improvement of the port of Kobe. It seems hardly probable that they would knowingly permit practices to take place which will in time nullify these expenditures by driving away trade. American ships have entered the field competing for their share of the trans-Pacific business. The port of Kobe is out after their business, and notwithstanding the fact that Japan has a large mercantile marine to foster, it can be safely taken for granted that conditions which

THE PORT OF KOBE: Landing Stage for Barges



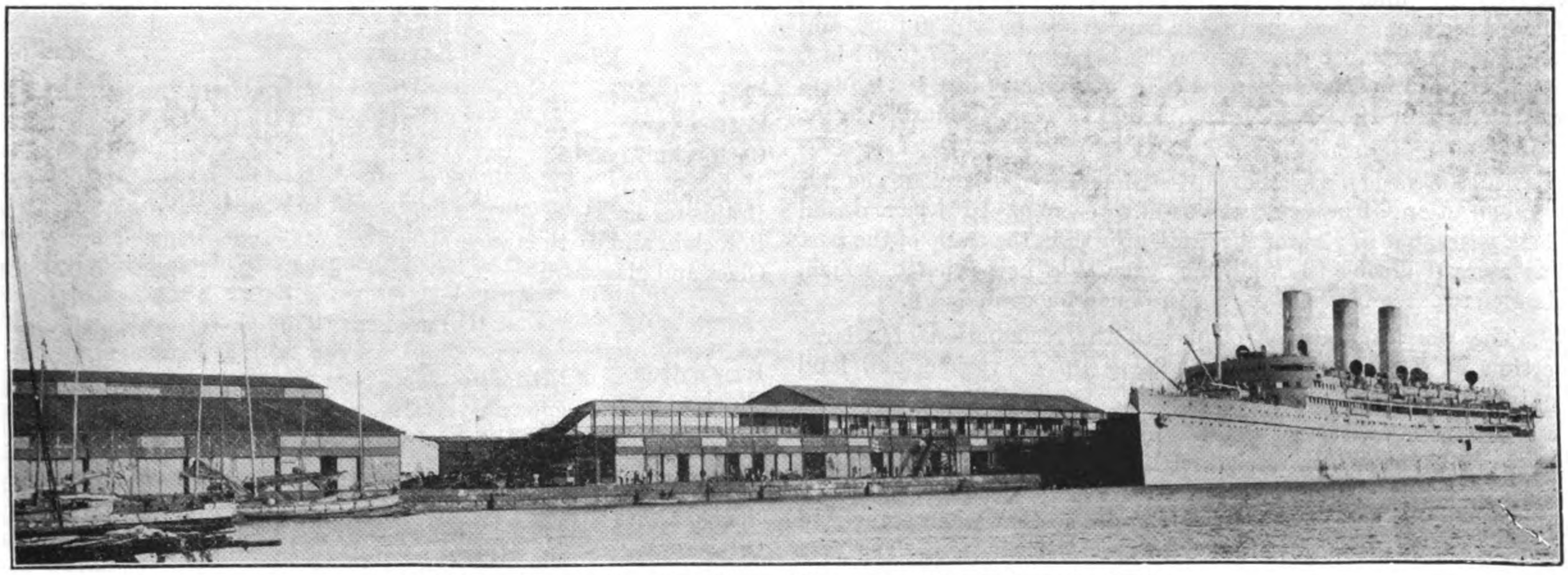
THE PORT OF KOBE: No. 4 Pier in Course of Construction



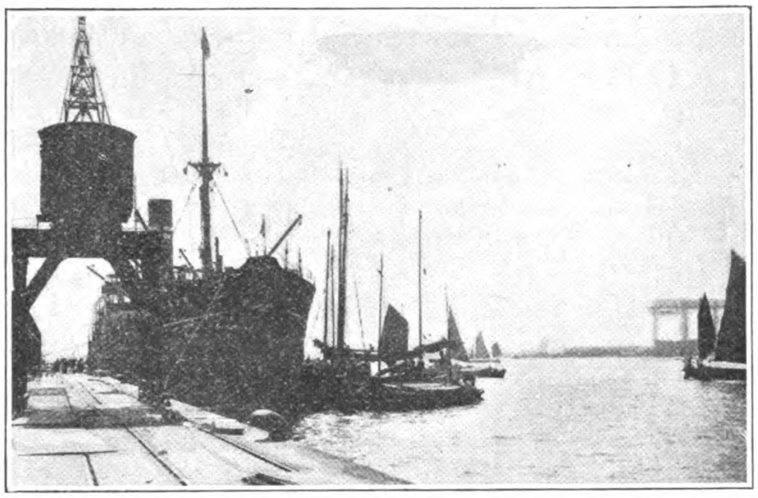
KOBE HARBOR

arose out of the war, can no longer occur, and American ships and cargo will receive every consideration and facility to induce them to utilize the port.

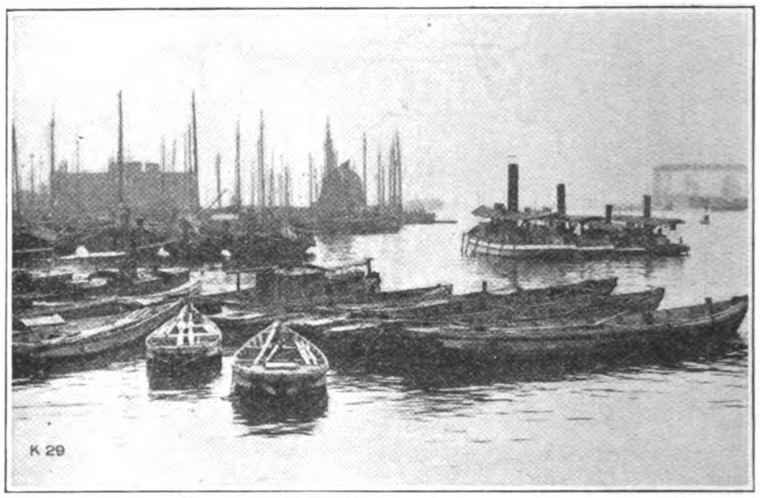
Those who find delight in ascribing the breakdown of the Kobe port facilities during the war to a set policy of discrimination against American goods on the part of the Japanese government, especially as it affected transhipments of American cargo, should, in all fairness, bear in mind that Kobe is the one deep-water outlet for the greatest centre of Japan's industrial activity. Like America, Japan was called upon to bear her share of providing the world with manufactured products during the war, calling for an unprecedented industrial expansion. This continued up to the collapse of the export business in April of last year. Kobe is a great manufacturing as well as a great distributing centre. In 1919, there were 2,147 factories in the city employing over 70,000 hands. The Kobe district also includes the most important industrial region of Japan, the Osaka Bay district, and consequently enjoyed more than any other part of the empire, the great wave of industrial prosperity which followed the war. In the Osaka Bay district alone at the end of 1917, there were over 5,000 factories, and by



THE PORT OF KOBE: No. 1 Pier. "Empress of Russia" on the Berth



THE PORT OF KOBE: View from American Wharf



Pier 4

the end of 1919, these had increased to over 6,000. It is estimated that at least 1,500 factories were created in Osaka as a result of the demand upon Japan for manufactured goods, requiring the importation of the plant, and the exportation of the products.

Japan had nothing to do with driving the American merchant marine from the Pacific. She expended millions in building up a mercantile marine of her own, and the first chance that she had to garner returns from this investment arose with the war and a clear field in the Pacific. If we bear this in mind, and also that her tonnage capacity was required to bring over the machinery to equip 1,500 factories and export the finished products, we can begin to appreciate the great strain that was placed upon the port of Kobe, largely as the result of an American policy, which, by catering to the labor vote, swept the Pacific Ocean clean of American shipping, and threw the burden upon Japan. With these truths before us, the wonder is that Japan was able to transport American cargo across the Pacific at all. Other nations faced with a similar problem would have Commandeered all available cargo space to foster and advance their own trade.

Kobe harbor is divided into three sections: two for merchant ships of all kinds, and the third for the vessels of the Japanese navy. It encloses altogether an area of 2,741 acres, and the general depth is between three and four fathoms.

The construction of the first harbor works at Kobe marks the very beginning of Japan's foreign trade, for it was in 1868—the year after the opening of the port—that customs offices, four landing places, and three warehouses were built. From 1873 onwards these works were steadily improved and extended, until in 1901 the port possessed altogether seven landing places, with varying accommodation, eight warehouses, and fourteen sheds. There were nine cranes, varying in capacity from 5 to 30 tons, and a private company owned a pier 90 *ken* long (*ken*—7-ft. 5½-in.), equipped with warehouses and sheds. A safe anchorge for lighters was created in 1902 by the completion of a new wharf in front of Onohama.

In 1905 a scheme for the construction of two new piers was put into execution. The work was to have been spread over a period of six years, but in view of the rapid growth in the trade of the port was merged during the following year in a new scheme, which, planned to extend over 15 years, is now nearing completion.

The work undertaken comprised the reclamation of a large portion of the shore, and the setting up of various new land equipments.

The reclaimed land extends from Onohama beach to the foreshore of the former foreign settlement along a line of a uniform depth of about 20 feet. Breakwaters will be built out from this line, with mooring quays alongside them, so that when completed the work will assume a "comb toothed" formation. The area filled in measures altogether nearly 90,000 *tsubo* (*tsubo*=about 4 square yards), and the reclaimed land rises over 11 feet above the mean sea level at low tide.

The total length of the mooring quays constructed is 1,592 *ken*, affording accommodation for about 19 vessels at a time. In addition to this a new extension has recently been undertaken, which will increase the length of the quays by 1,500 *ken*. The embankment of the reclaimed land also provides anchorage for small vessels drawing about 9 feet, and two special unloading places have been constructed for lighters.

The port is now well provided with land equipment and storage accommodation. There are 18 large sheds built alongside the quays and divided into waiting rooms, offices and stores for cargoes of every kind. Railway lines connect these sheds with the quays, and with the trunk line passing through Onohama station. There are also wide-gauge rails laid along the entire length of the quays for the travelling cranes.

The expenditure for these works, including the reclamation of land and the various extensions undertaken, amounts to a total of Y. 37,430 million, and the management is in the hands of the department of finance and the department for home affairs.

The work is not yet completed, but already it has improved the facilities of the port sufficiently to render Kobe the central freight market of the East, and when the new extensions are completed, Kobe will possess one of the finest harbors in the world.

The exports and imports passing through this great distributing centre are of the most varied character. The influence of the cotton industry of Osaka is felt in both cases, raw cotton being the most important import and cotton goods the leading export. The following table gives the chief figures for the first half of 1920:—

EXPORTS	Yen.
Cotton textiles	49,151,875
Cotton yarn	23,055,921
Cotton knit goods	11,482,719
Matches	15,000,295
Braids for hats	11,394,274
Porcelain and earthenware	6,387,597
Glass and glassware	5,971,458
IMPORTS	
Raw cotton	388,307,725
Wool	71,598,339
Iron	56,960,865
Iron ore	15,305,864
Sugar	9,707,228
Beans	11,116,749
Oil cake	34,354,109
Machinery	22,105,874

An Elevated Railway for Shanghai

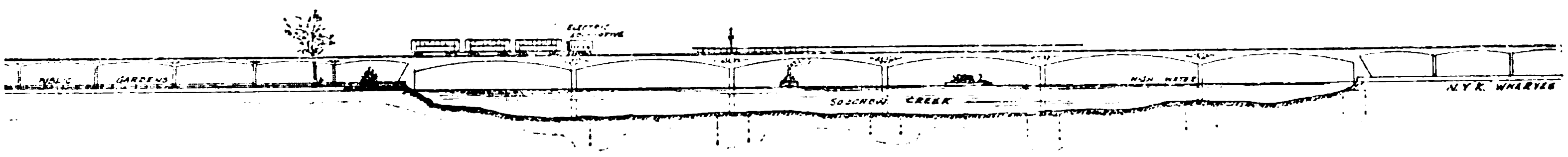
IT was only a few weeks ago that a serious-minded and deep-thinking gentleman, who had stayed in Shanghai sufficiently long to be much impressed with the city, on the eve of his departure sent to the *North-China Daily News* an open letter to Shanghai, in which he made various suggestions for the improvement of the settlement itself and its government. His ideas were very favorably commented upon in places where such matters are discussed, though there was one point—his idea for the improvement of traffic conditions—which many held to be too advanced, if not impracticable, for Shanghai. That was an elevated railway.

Such a thing had been hinted at before, not unnaturally with the ever increasing number of Americans coming here, but his was the first proposal put seriously into print. Curiously, a local expert had for a long while been working out this very matter and we are now able to put forward his suggestions. The author is Mr. Sidney J. Powell, A.M. Inst., C.E., the well-known civil engineer, architect and surveyor. It should be pointed out in the beginning that Mr. Powell's scheme is but a suggestion, not the definite plan of an established company, though it is a fact that some highly placed and influential gentlemen who have seen it are already anxious to take it up as a commercial proposition. Mr. Powell, however, has worked on it as though it was a definite scheme. He has presumed that he has the funds and the territory and has accordingly worked out specifications, quantities and materials in a strictly professional way, so that the plan must be considered as something more material than a dream.

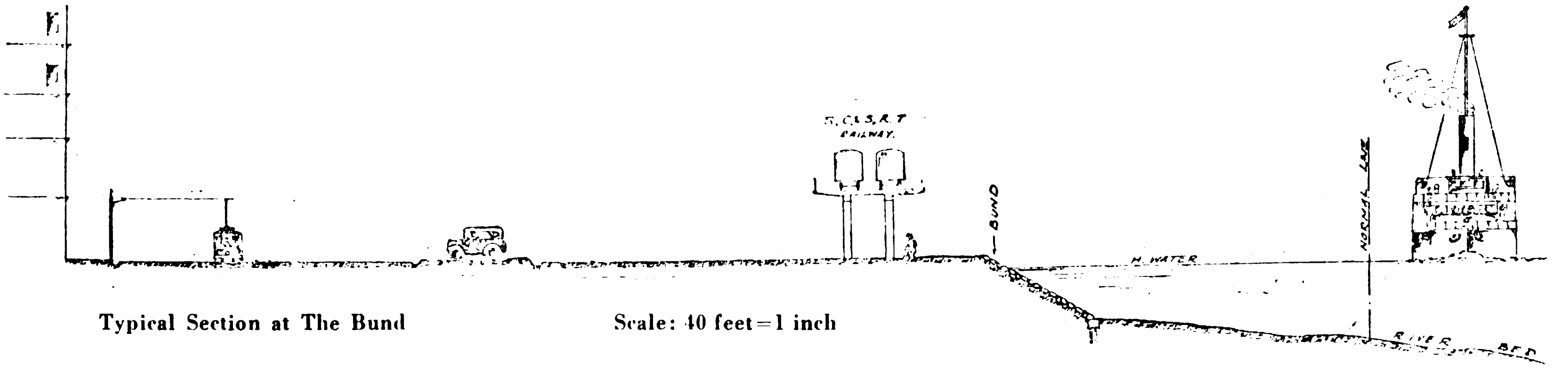
Mr. Powell is, of course, well acquainted with local conditions and when asked about the great query regarding an elevated railway—Will Shanghai's soil stand it?—he said there was no question that the scheme was feasible. He admitted there would be difficult places, but concrete rafts would meet the case. He foresees difficulty regarding way leaves, but does not consider them insurmountable and, anyway, if a definite scheme is decided on, a route may be chosen which will not offer such troubles.

An Eye to the Aesthetic

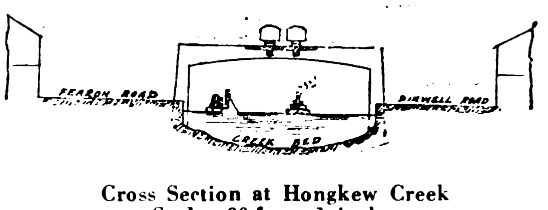
The author has an eye to the æsthetic and his railway would not be an unsightly business like the New York elevated line, with its great timber baulks and the accompaniment of roaring trains. Mr. Powell has planned for concrete standards of artistic design, rigid and solid enough to ensure that there will be less noise than is at present caused by a passing tram car. Many will no doubt wonder at the small figure at which he places the initial cost, but he says it has been carefully worked out and the inner circle, if work proceeds on several sections simultaneously could be completed and in operation in a year. For power he suggests relying on the municipal supply, adding something over Tls. 500,000 per year to the settlement's revenue, or this expenditure could be capitalized for a separate installation.



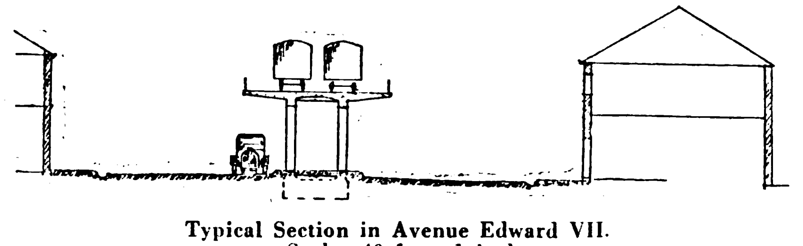
Elevation of Bridge at the mouth of Soochow Crrek (parallel with Garden Bridge) Scale: 80-feet=1 inch



Typical Section at The Bund Scale: 40 feet=1 inch



Cross Section at Hongkew Creek
Scale: 80-feet=1 inch



Typical Section in Avenue Edward VII.
Scale: 40 feet=1 inch

The Broad Outline

The following is an outline of Mr. Powell's scheme :—

The proposed railway will run on an elevated track constructed of re-inforced concrete and coming down by easy gradients to the level of the Shanghai-Nanking Railway, as it approaches that railway's property and will, with their co-operation, run on their property from Jessfield Station to where the track leaves their main North Station. The branch to their South Station (Hangchow Line) can come down to ground level after leaving the boundaries of the native city.

The railway to be electrically powered on the centre rail system, thus obviating overhead wires. It will be capable of conveying

passengers from the Bund to the western or eastern districts in a few minutes. The seating capacity of each train can be at least 500. The services proposed would be an inner circle running from the Bund viâ Avenue Edward VII. Thibet Road, North Thibet Road, Shanghai-Nanking North Station, end of Range Road, Hongkew Creek and back to the Bund, and an outer circle service to run from the Bund viâ Jessfield Station and the Shanghai-Nanking Railway North and back to the Bund. Intermediate service to South Station (Hangchow Line) and to Wayside.

Art and Utility

The railway would obviate any destruction of the Public Gardens and, as the concrete arches permit of graceful design, should not be unsightly. At the same time, it will provide a shady walk. The railway would relieve existing and increasing congestion of traffic in Shanghai, as it would not only cope with passenger traffic, but would deal with goods which at present are conveyed from mills and factories in different parts of the settlement and outlying districts, taking this traffic off the already overcrowded existing roads.

The cost of the railway would be considerably less than the cost of widening existing roads and, at the same time, it would increase transportation possibilities in a much greater proportion than a road widening, in that a road widening of 10-ft. does not increase the speed of transportation considerably, whereas the proposed railway does do so. The railway would not interfere with the passage of existing means of transport. It would run on or over public or railway property throughout its entire length, except for short distances and over those distances could no doubt secure the co-operation of property owners, in view of the facilities derived.

A Moderate Cost

The estimated cost of the elevated track is Tls. 16,400 per length of 100-ft., including foundations, columns, platform, rails and sleepers, but not including rolling stock. The average cost of acquiring a strip of land 20-ft. wide along Peking Road would be Tls. 22,000 per length of 100-ft.

The total estimated cost is as follows :

Elevated Track.—Inner Circle.		
The Bund, Avenue Edward VII, Thibet Road, Shanghai North Station, Hongkew Creek and over Soochow Creek, back to the Bund, 270 by Tls. 19,000...		Tls. 5,130,000
Branch to end of Avenue Foch, 130 by Tls. 19,000		2,470,000
Continuation at low level to Jessfield Station, 75 by Tls. 600		45,000
40 *mow* at Tls. 2,000		80,000
Extension to Wayside, 60 by Tls. 19,000...		114,000
Extension to south of native city, 65 by Tls. 19,000		125,000
Extension at low level to South Station (Hangchow Line), 30 by Tls. 600 ...		18,000
		Tls. 7,982,000
Allow for stations		850,000
Rolling stock—		
Ten locos. at Tls. 5,000 ...	50,000	
Cars and wagons, 50 at Tls. 8,000	40,000	
Equipment, signals, etc. ...	100,000	
		190,000
		Tls. 9,022,000

Annual expenditure—

Staff, etc., per annum	Tls.	96,000
Power, per annum		547,500
Stores, etc.		50,000
Interest charges		500,000
	Tls.	1,193,500

Annual revenue—

Passengers (2,000,000 per week), 2,000,000 by 10 cts. by 52 = $10,400,000 ...	Tls. 7,200,000
Goods (500 tons per day), 500 by 365 = 182,500 tons at $2 = $365,000 ...	262,800
	Tls. 7,462,800

The above is Mr. Powell's scheme. He has studied elevated railways elsewhere and has made comparisons. Also he says that he is confident he has not underestimated the expenses of his railway, nor overestimated its probable revenue, but rather the reverse in each case.

Mining Resources of China

COMMENTING on the need of a development policy on the part of those interested in China mining the Peking correspondent of the *London Times* says The Royal Society of Arts has recently offered a money prize and silver medal for a paper on the "Mineral Resources of China," conditions relating to which have just reached Peking. The fact that so influential a body is so far interested in this country is, of course, gratifying to those concerned with mining, and in ordinary circumstances competition for the honor of winning the prizes would have been keen. To those particularly interested, however, the subject for the paper is not happily chosen, for the following reasons.

In 1908 Bailey Willis, in *Economic Geology*, and, in 1911, T. T. Read, in the *Transactions of the American Institute of Mining Engineers*, treated the self-same subject exhaustively. In 1919 the Geological Survey of China published—in the Chinese language—two comprehensive bulletins on the geology and coal and mineral resources of the country, and a third one is in preparation relating to the iron resources. These two bulletins, together with the one about to appear, practically cover the whole ground as far as it is possible for it to be covered in a country where scientific investigation is in its infancy, and political conditions so chaotic that systematic study is extremely difficult. The Chinese bureau of mines, in fact, is a repository of all that is known about geology and mining in China, but much of this knowledge is locked away in a language inaccessible to all but a very few. Anybody knowing Chinese and having access to the information stored by the bureau would have an enormous advantage in competing for the prizes offered by the Society of Arts. The paper so written might be extremely interesting, but it would not contain much that was original on the part of the writer, nor would there be any serious competition against it.

What is really wanted is discussion, not on the mineral resources of China, for these are as well known as they can be in present circumstances, but on their development. The bureau of mines in Peking does everything for geology and nothing for mining, except to draft strangulatory regulations. The treaty powers protested against the Chinese mining regulations of 1914, and the government called in Mr. G. G. S. Lindsay, the well-known Canadian expert, to draft fresh regulations. His draft, however, has been pigeon-holed, and mining development in China, so far as foreigners are concerned, remains at the starting-point of 1903.

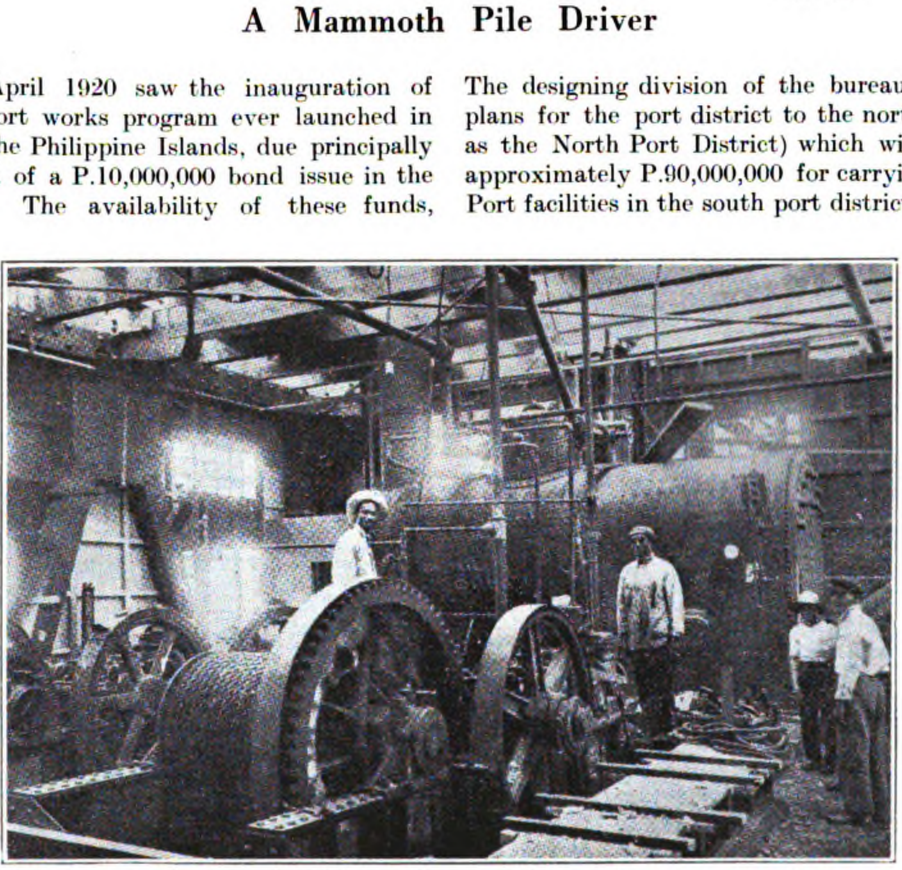
Aerial View of Manila Harbor

Port Works in the Philippines

A Mammoth Pile Driver

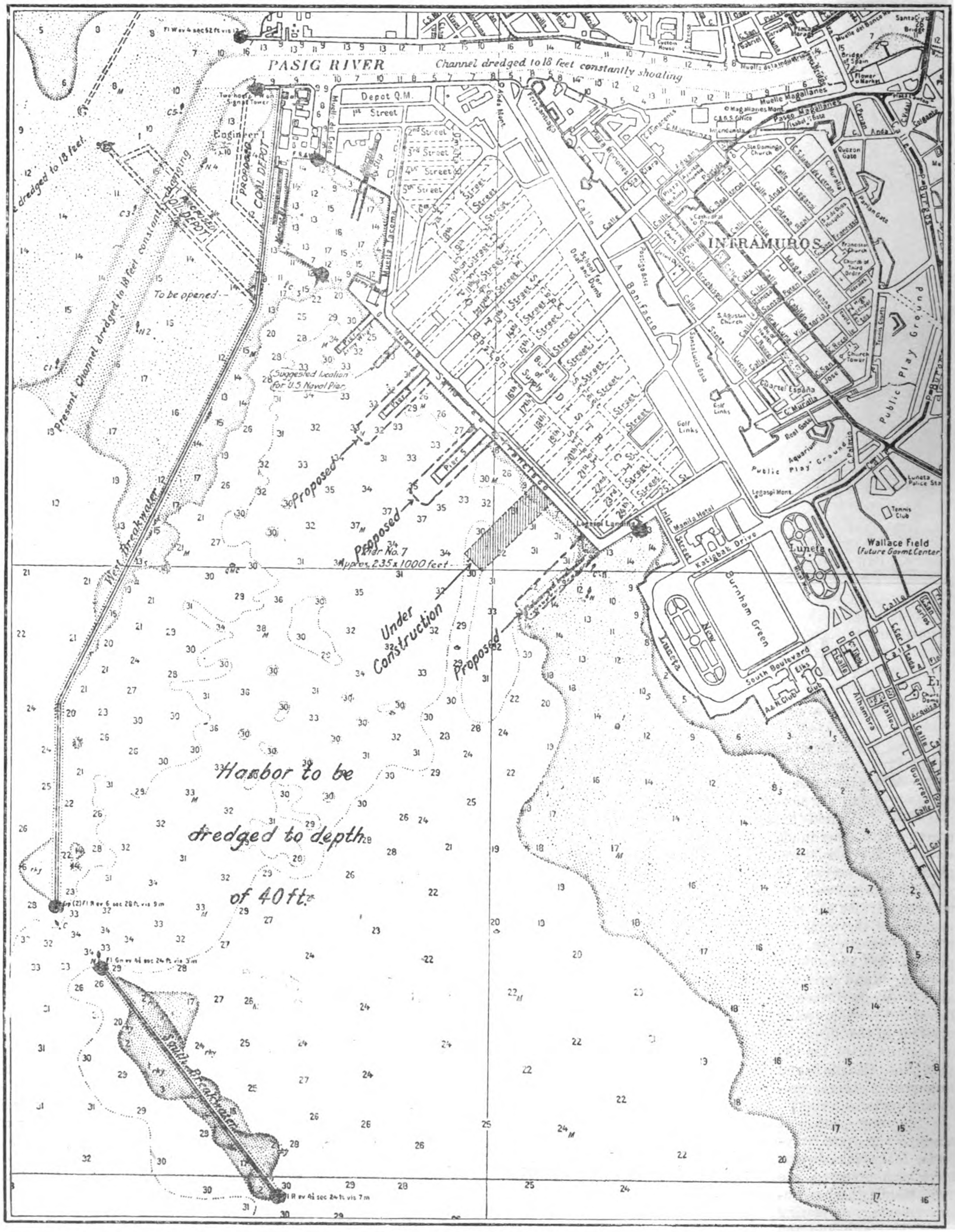
THE month of April 1920 saw the inauguration of the greatest port works program ever launched in the history of the Philippine Islands, due principally to the flotation of a P.10,000,000 bond issue in the United States. The availability of these funds, together with other funds voted by the legislature, placed the bureau of public works in a position to proceed with the preparation of the plans for the various harbor improvements throughout the Islands and considerable work was accomplished by the designing division in this direction as regards plans for the port of Manila and numerous other provincial ports.

Standing foremost among the port projects, for which designs have been prepared, are the Manila harbor improvements, embracing both the south and the north port districts. The designing division of the bureau of public works developed plans for the port district to the north of the Pasig River (known as the North Port District) which will involve an expenditure of approximately P.90,000,000 for carrying the project to completion. Port facilities in the south port district, which will soon be realized, bid fair to place Manila among the leading ports of the world, in so far as the handling of cargo is concerned.

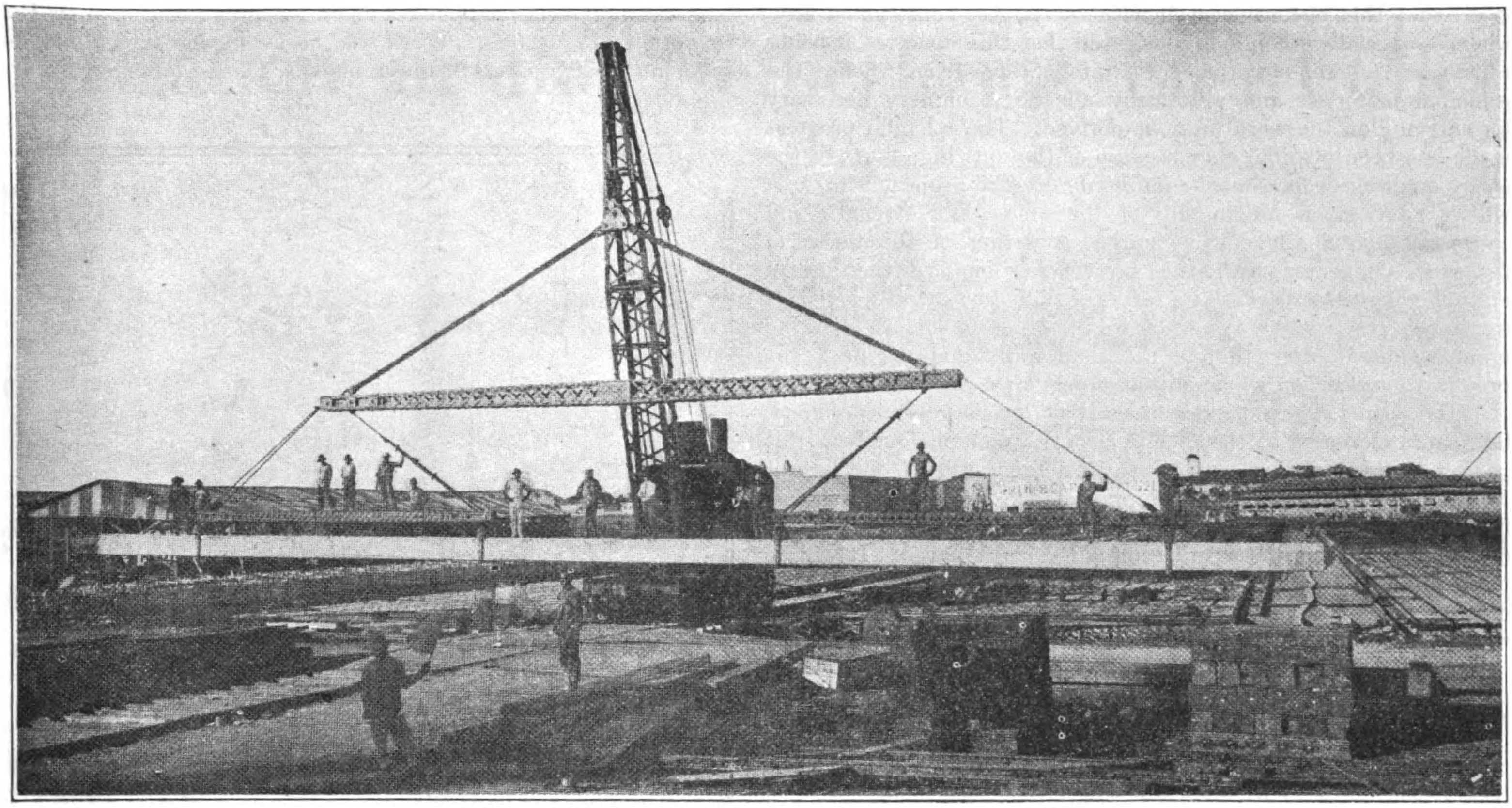


Interior View of Pile Driver "Mammoth," Pier No. 7, Manila, P. I.
This view shows the boiler room and two forward spud engines

The improvements mentioned above, include plans for the extension of the break-water in the south district, for the closing of the gap and for the opening of a channel at the south end of the existing south break-water; for the opening of a channel into the Pasig River as well as the details for the superstructure of Pier No. 7. A feature of this work was the construction of the steel pile-driver *Mammoth*, which is the largest and



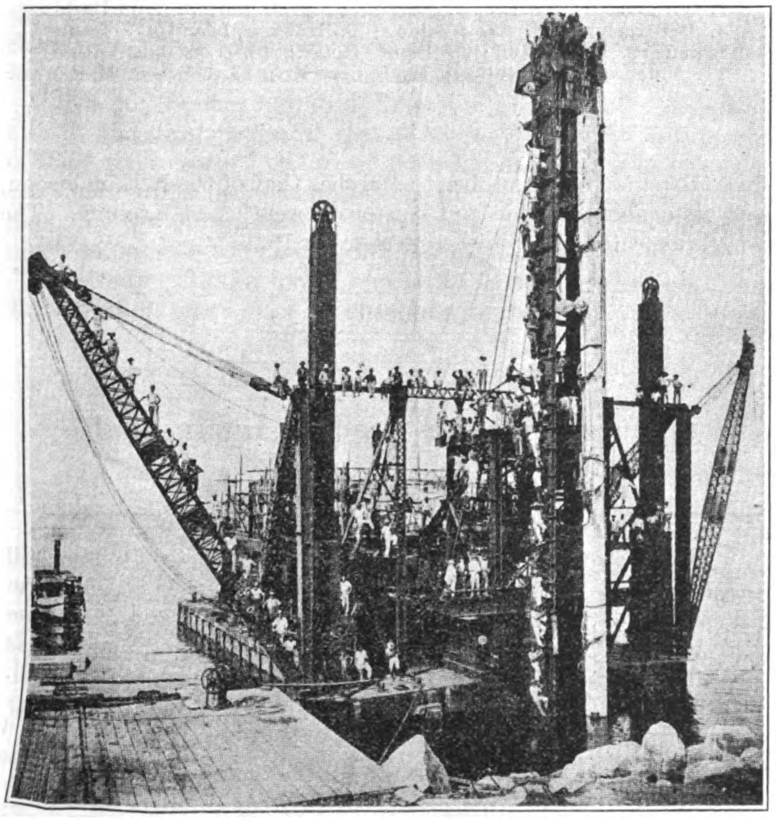
MANILA HARBOR



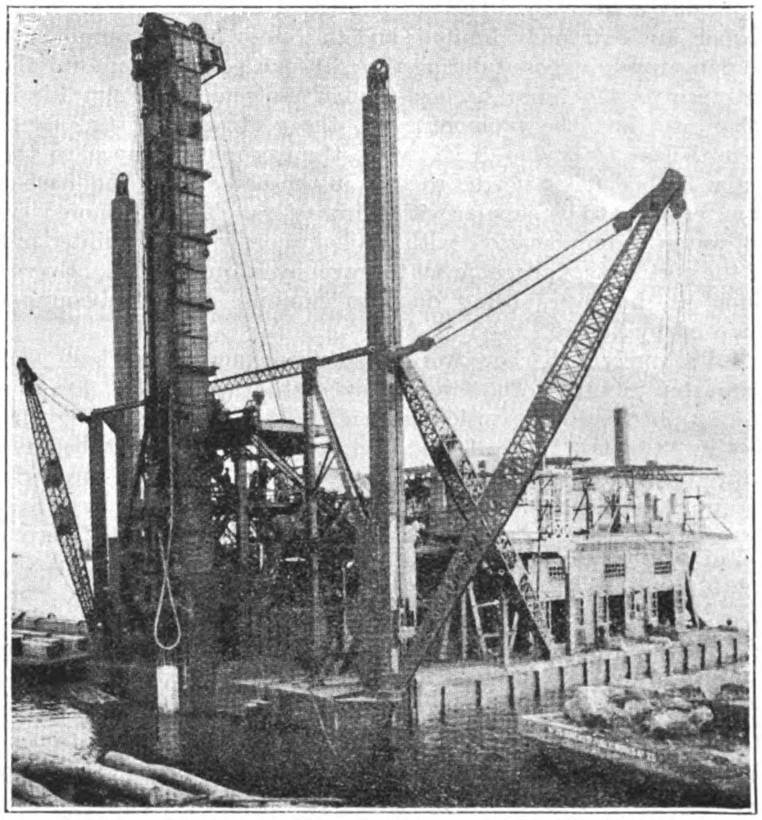
General View of Pile Crane, Pier No. 7, Manila, P. I.
This view shows the Pile Crane steaming towards the Pile Scow carrying a 110-foot Concrete Pile

most modern pile-driver ever constructed anywhere either locally or in the United States. The 1,000-ton hull for this fine piece of equipment was launched late in November. This machine is now driving the 24-inch by 24-inch by 110-foot substructure reinforced concrete piles for Pier No. 7. Its possession places the government in an independent position as regards its ability to construct marine terminal structures of the most modern type. Henceforth, it will be available, for the construction of piers, wharves and sea-walls throughout the archipelago—enabling designs to be executed which were heretofore impossible due to the lack of suitable equipment. The pile-driver was commissioned and commenced driving piles in March 1921.

Very satisfactory progress has been made in the construction of Pier No. 7. This fact can be better appreciated when it is under-



Bird's-eye View of Pile Driver "Mammoth"



General View of Pile Driver "Mammoth" in operation, Pier No. 7, Manila. P.I.
This view shows the driver and hammer hoisted just above the pile after completing driving

stood that this pier ranks well with the largest constructed anywhere—especially when it is considered that this structure is being constructed so remote from the United States from whence the principal materials and practically all the machinery necessary for carrying on the work must be derived. The splendid progress made has been possible only because of the untiring efforts of the entire engineering personnel connected with the project, who, as a whole, have given unstintedly of their time and strength and co-operated so closely. This close co-operation of the technical personnel connected with this project has enabled the bureau of public works to marshall its forces of skilled mechanics, artisans, carpenters and workers as a whole and to create a smooth working organization of more than a thousand individuals to push the project to conclusion as rapidly as possible.

The most modern engines of construction have been designed, fabricated, brought to the Philippines and commissioned on this project in an incredible short time. One of the finest and largest cranes ever brought to the Philippines was designed and is now being fabricated, and utilized, first in handling the large concrete piles (see illustration) and later, in handling the ships' cargo. It will be possible, upon completion of the pier, by the use of this crane, to discharge single pieces of machinery or ordnance weighing as much as 80 tons—a task which has heretofore required the erection of special equipment each time a large piece of machinery was to be removed from a vessel at Manila.

Extension of Keelung Harbor Needed

THE principal channel of the import trade of Formosa is Keelung, which is the nearest port to Japan. The harbor as it is to-day is wholly a product of Japanese enterprise, since at the time of the cession of the island by China the inner harbor was too shallow for any but small craft, while the outer harbor is exposed and dangerous during the N.E. monsoon in the winter months. The natural disadvantages of Keelung harbor can, indeed, never be wholly eradicated. The possibilities of expansion of the inner harbor are extremely limited, and the outer harbor cannot but be dangerously exposed during the monsoon period ; moreover the entrance to the inner harbor, though protected by Palm Island (Sharyoto) and the promontory to the southward of the same, nevertheless faces due N.E., while the exposed entrance to the outer harbor faces north, so that in the bad season the harbor is never likely to be popular with shipmasters. There is, moreover, no water communication with Taihoku or with the hinterland of the port, so that all traffic has to travel by rail or by road. Everything is, however, being done to minimise the disadvantages imposed by Nature.

The present harbor works were commenced in 1899 and completed in 1913. They were designed to deal with 250,000 tons of cargo, but recent expansion has rendered the facilities inadequate, and in 1919, the "boom" year, the cargo dealt with reached the unprecedented figure of 850,000 tons. The harbor can properly accommodate four ships of 6,000 tons alongside the pier and seven more of from 3,000 to 8,000 tons moored at buoys, a total of eleven vessels. As many as sixteen vessels have been berthed on occasion at one time, but great congestion has prevailed and stevedorage charges have perforce been high.

The need for extension is obviously great, and Keelung, moreover, possesses no proper facilities for handling coal, the export of which expanded from 11,000 tons in 1913 to 423,000 tons in 1920. The drop in the price of silver has caused a diminution in the export of Formosan coal to the Chinese market, and the figures for 1921 are likely to be considerably smaller than last year's, but it is hoped that economies effected in loading expenses at Keelung may help the industry to regain its prosperity.

A comprehensive scheme of extensions was sanctioned in 1920, to cost Y. 13,560,000. Work was begun in September last, but so far no great progress has been made. This is, however, natural,

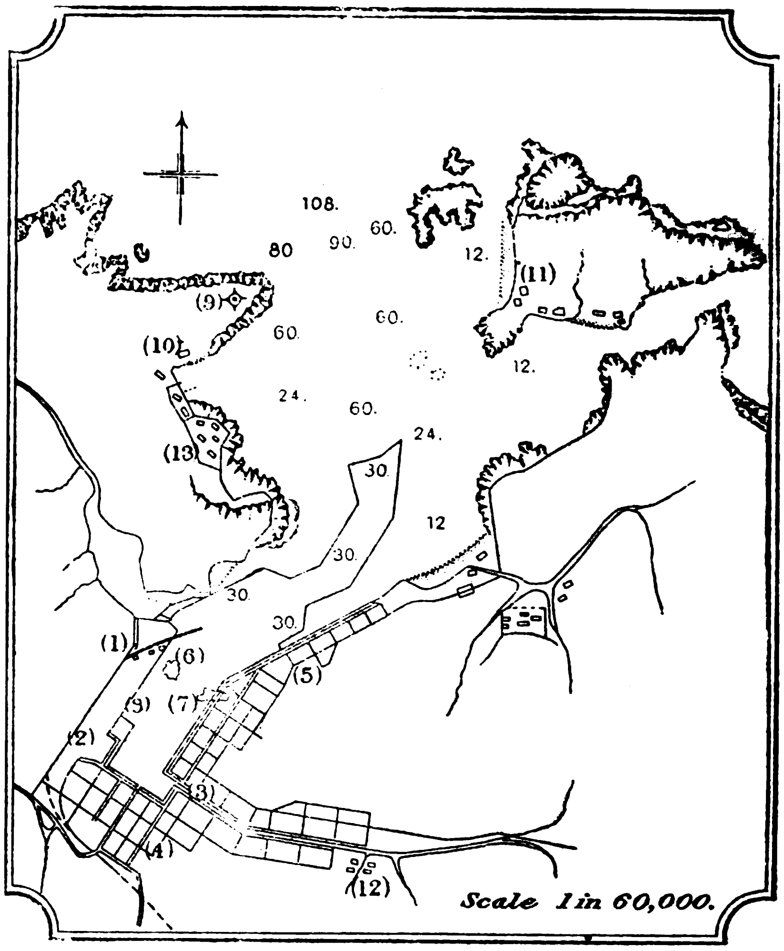


CHART OF KEELUNG HARBOR

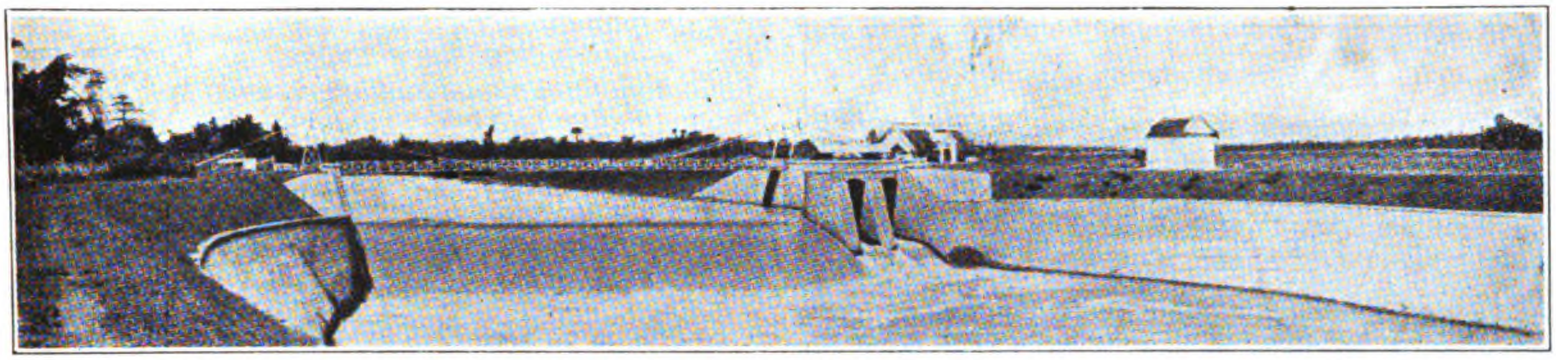
1. Old Railway Station; 2. New Railway Station; 3. Gijiu Bashi; 4. Dai-Keelung; 5. Sho-Keelung; 6. Haukan Island; 7. Haubo Island; 8. Quay Wall; 9. Light House; 10. Port Quarantine; 11. Meteorological Station; 12. Denryo Ko; 13. Office of Harbor Works

since the period from October to March is that of the N.E. monsoon, with its consequent rain and boisterous weather at Keelung. The work is expected to be finished in the year 1926.

Manufacture of a Product Interestingly Disclosed

The manufacturers of "Armco," the American Rolling Mill Company, have sent us a beautifully made up book in which the full process of the manufacture of their products from the time that the rough ore is gathered up from mother earth until it is made into serviceable shape for shipment to the trade is presented. Not only this, there is given a history which is interesting to any who may not be concerned with the iron and steel business, and we find also much that the Company has done in the way of making the lot of the employee more interesting, more pleasant. The book is exceedingly well illustrated and will prove a serviceable adjunct to the working table of any engineer or business man.

Irrigation in the Netherlands East Indies



Reservoir on the Madioen River

THE growing of Java's principal food crop, rice, in general depends to a great degree upon the arbitrary disposal of a large supply of water.

To provide for this need, the water from the rivers must be used for irrigation. The construction works by means of which the water is drawn from the rivers and distributed over the rice-fields, were originally planned and carried out by the natives themselves. Naturally this could only take place in a primitive way and besides had to be limited to the drawing of water from wells and smaller rivers. Nevertheless, the people have obtained very satisfactory results with the means at their disposal, and even at the present time about 55 per cent. of the rice-fields are watered by means of primitive canals constructed by them on the initiative of their chiefs, of materials with little durability such as bamboo, wood, straw, loose stones, etc.

In the course of time, however, the primitive irrigation works constructed by the people led to many difficulties; their upkeep cost much labor and much material, the canals worked into rivers, while the rivers themselves by alluviation lost a great deal of their transport power and often the irrigation system constructed in this way changed into an inundation. The results obtained from these irrigation works, moreover, do not answer the requirements for the desired rice production of the archipelago.

The government has always more or less promoted irrigation, also by the construction of various works. Since the last quarter of the former century, however, attention has been paid to a more systematic irrigation, which has been taken almost entirely into the hands of the government. Irrigation is now being perfected as much as possible with might and main.

Already in 1885 a special service for irrigation was established. The officials of this service are charged with the study, the projection and construction of new works and the management and maintenance of those already existing. They also pay attention to the improvement of the waterworks of native construction.

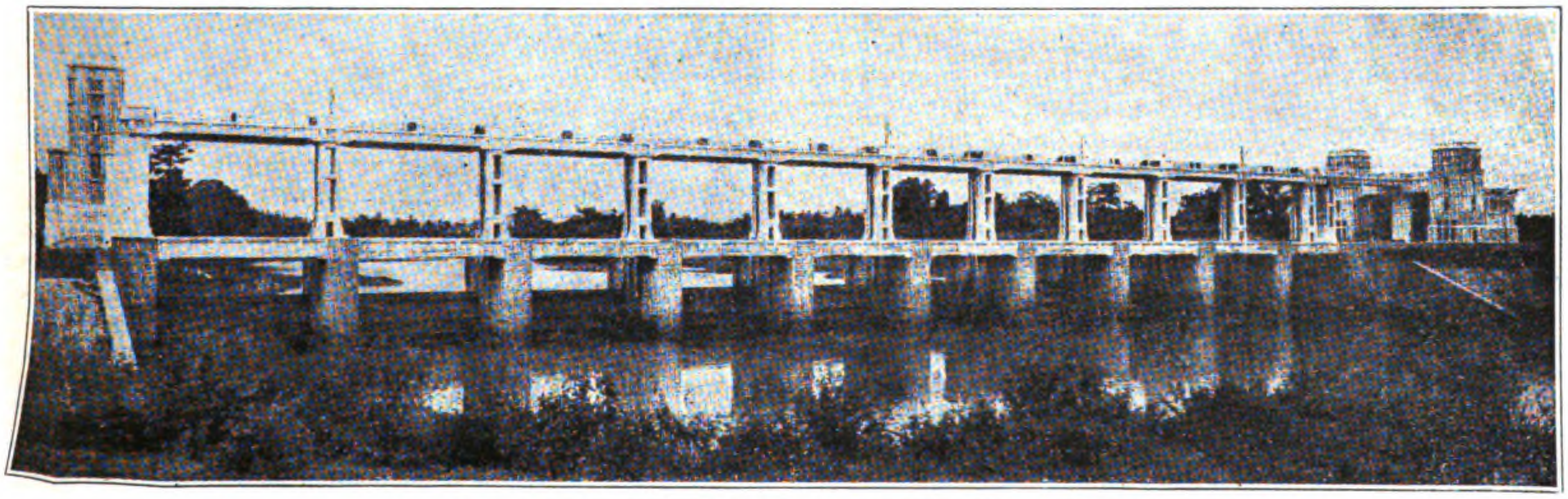
In view of the fact that the people's interest is concerned with the management of the waterworks, the heads of provincial government have the supervision of the management in their residency.

The main regulation of the water is in charge of the technical staff; with the regulation within the main area the staff has nothing to do and it is intended in the future to leave this entirely to the native farmer, whereby only the strictly necessary information will be given by agricultural experts.

This, however, has not yet been possible, so that for the most part that part of the system which has been partly or altogether improved, is still in the hands of the government or of the department of irrigation.

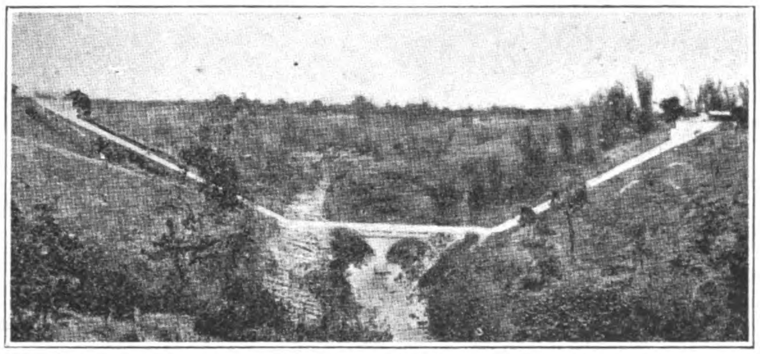
As far as it is possible the flow of water is regulated according to fixed rules, whereby the irrigation keeps place with the quantity of the water supply at a certain time of the year. At the end of 1919 there were seven irrigation sections in Java; where such sections have not yet been established the management for the present is in the hands of the department in charge of the construction of new works.

As soon as the rice-fields which were planted in the west monsoon are no longer in need of water, the supply, in districts where the sugar industry is carried on, is in a large measure free for the sugar-cane fields, which require irrigation only in the east monsoon. During this time, however, the natives use a part of their rice-fields, providing they have not rented them to sugar growers or other estate owners, for a second rice crop, or for the planting of a so-called secondary crop, including such products as maize, pulses, arachides, tobacco, indigo and cotton. In case



Irrigation Reservoir in the Tjibedjoeng River, North Bantam, N.E.I.

there is a scarcity of water the necessary irrigation is often supplied to the natives by observing the so-called day and night system, whereby the owners of the sugar plantations have the water at their disposal during the day and those of secondary crops only during certain hours of the day and at night. By using reservoirs,



Aquaduct over the Metro River

such as are already in use or in the course of construction in most of the sugar-cane districts, for storing the water at night, it is hoped that before long this system, which has serious disadvantages for the natives, can be abolished and a condition brought about whereby water will be supplied during the day to all who need it during the east monsoon.

By the improved system of irrigation, not only has the area planted in rice and sugar-cane been extended, but the yield per *bouw* has been increased, especially as averaged over a number of years, due to the fact that failures of crops have been considerably diminished, while the planting of secondary crops has been increased.

In 1919, there were twenty-four important irrigation works in course of construction, while plans were being made for several more. Besides these, a great number of smaller works, improvements and reconstructions are constantly being attended to.

A factor which is also receiving attention, since it is of the greatest importance to all branches of agriculture, is the care for a regular system of drains and dams, so that besides irrigation and drainage, the construction of dams is either being carried out or is being planned.

Except in Bali, irrigation in the outlying possessions is not yet of great importance, though it is increasing.

Some of the works that the natives have constructed in this island are far superior to similar works in Java.

In 1910 the government made an enquiry regarding the existing and the desired irrigation works in Sumatra and Celebes.

The reports written on this enquiry mention, as do those for the south and east divisions of Borneo, a number of districts where the construction of works would be desirable and also profitable, considering the quantity of water available in the river. Several of these works have since been projected and carried out.

In most of the provinces outside Java and Madura civil engineers are now appointed to construct or improve irrigation and drainage works. The authorities, also, in these districts are showing increasing activity in this respect.

The following gives a review of the total area of irrigated land in Java, also of the amounts expended on construction and upkeep during a successive number of years.

Review of Irrigated Land in Java

		Hectares	Per cent.
I.	Irrigated areas where permanent works are in use	584,000	21
II.	Irrigated areas where permanent works are in course of construction ...	300,000	11
III.	Irrigated areas for which permanent works are either under consideration or in course of preparation	471,000	17
IV.	Irrigated land and land dependent on rain, for which no plans have yet been made	1,400,000	51

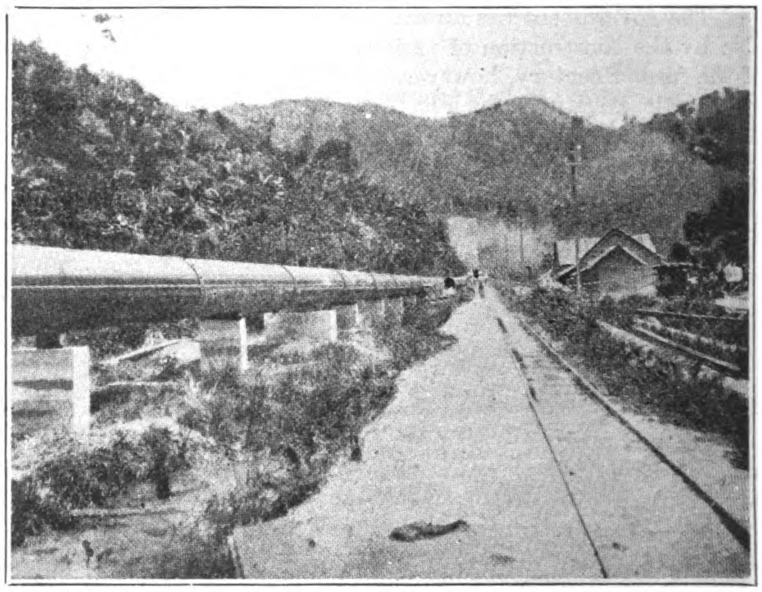
Costs of Irrigation Works

Year	Total amounts (in guilders) spent on the construction and preparation of irrigation and drainage works: Java and Madura	Outlying Possessions	Repairs and general upkeep
1914.......	6,177,802	523,734	787,231
1915.......	4,870,578	602,405	1,328,798
1916.......	5,974,539	711,410	1,796,168
1917.......	7 380,725	762,745	1,796,998
1918.......	9,055,824	785,570	2,728,103

Straits Tin Position

Mr. F. E. Mair, of the firm of Messrs. Osborne and Chappel, of Ipoh, Perak, managers of a number of British tin-mining companies operating in the Federated Malay States, commenting on the action of the F. M. S. government in buying tin when there was no market for it, said (in a speech reported in the *Mining World*): "During the four years I was in the East they did this on two occasions. When the government decided to buy tin last November or December they fixed a price of $110 a picul, equivalent to £220 per ton. The majority of the more influential Chinese approached the government, and told them it was impossible for them to produce tin at that price at a profit. I may say that the government hardly gave credence to their statement, but at the same time a committee was formed and a close examination made of the books of the representative Chinese mines. It was proved without doubt that the Chinese could not produce tin for $110 a picul at a profit.

"Well, that means 70 per cent. of the output of the Malay States is being produced at a loss, and I do not think the Chinaman, who is a very shrewd business man, is going on doing that indefinitely, and therefore it is more than probable that you will see a big reduction in the output of the Malay States. Gopeng Consolidated and a favored few can produce tin at a profit at the present price, but they are very few. If the present price continues it will mean that numbers of mines will close down ; in fact, I have been advised from the East that many have been already closed since I left."



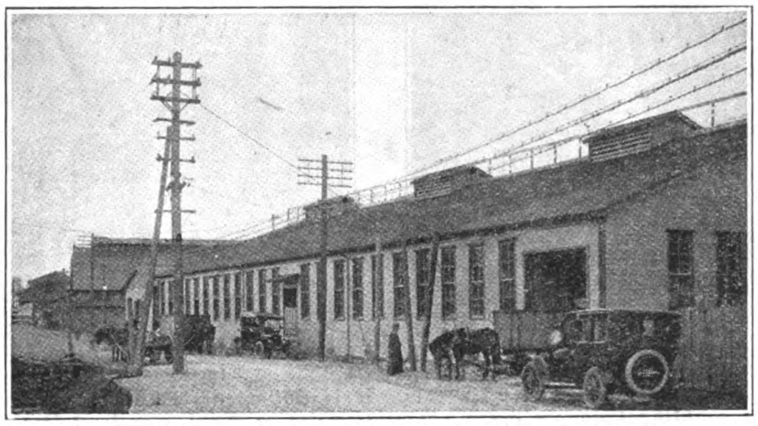
Gopeng Consolidated Tin Mines, F.M.S., 43 inch Pipe Line

This news and the fact that the F.M.S. government is holding its accumulated tin in the hope of selling it at a profit doubtless largely accounts for the recent recovery in the metal, and will permit of the more rapid absorption of the floating supplies of the metal as trade generally revives.

A Ford Assembly Plant in Japan

A FORD motor car, completely assembled from two hundred pieces, and ready to take the road in Yokohama, just one and one-half hours after it leaves the customs in the Japanese port city,—this is the record of the Negishi assembling plant of Sale and Frazar, Ltd., the most complete and modern Ford assembly plant in the Orient. In progressive stages one may see the Ford passing through the Negishi plant of Sale and Frazar, located at 408 Horinouchi, Nakamura-machi, Negishi, Yokohama. In a big frame building, 148 by 108, the crates containing the Fords are unloaded. The crates arrive at a big unloading platform, direct from the Pacific Ocean docks, to which place they have been carried by a steamer from New York via the Panama Canal.

Once uncrated the Ford is handled by various shifts of workmen in the Negishi plant. The entire place, which has been opened only since July, 1920, is in charge of H. F. Brett, who, before his entrance into automotive work in the Orient, was connected with the Ford plants in the United States. Brett, F. Bennett, E. Strobel and C. K. Caswell form the managing staff at the big Yokohama Ford assembly plant. Bennett was with the Highland Park Ford plant 15 years while Brett served there for seven years. Both speak of the similarity between Henry Ford and E. W. Frazar, their present chief. Frazar, who has, by his importing and exporting business in the Orient, built up huge interests in Japan, is a fairly tall, grey-haired, forceful appearing man. He makes frequent visits to all of the Sale and Frazar interests in Yokohama and Tokyo, "dropping in on us," so the men at the Negishi plant say, "much the same Henry Ford did in the U. S. A." The men who work for E. W. Frazar seem to take the same personal interest in his undertaking as the men who work in the Ford works in the United States are said to do. It has been a great source of pride to all of the men connected with Sale and Frazar to watch the growth of the Ford branch of the Sale and Frazar work, and, since the opening of the Negishi plant, the only one that can be said to be a real assembly plant in the Orient, frequent visitors interested in automobile business, have been taken out to Negishi, for a look.



Exterior View of the Assembly Plant at Negishi, Yokohama

Other Ford Products

The head of the Sale and Frazar interests in Japan, and in the Orient, is able to branch out in many ways. In the 15 acres that takes care of his interests at Negishi, he has a Ford assembly plant, a Fordson tractor demonstration grounds, with tractor drawn agricultural implements ; he has a big storehouse for Ford parts, and a lumber mill.

But, to return to the trip of the Ford, from the 200 piece stage to the place of a first-rate looking Ford touring car. Ceiling chains, and lifts hoist the body out of the big box. The box which the Ford comes in weighs 2,349 pounds. It is 9 feet 2 inches long, its width is 4-ft. 8-in., and its height 3-ft. 9-in. Once the parts have been lifted from the big box the work on the rails on one side of the plant may begin. There are crews of men to handle each stage of the assembling of the Ford. This is a great departure from the way the work was handled a few years ago. The frame, the rear springs, the running boards brackets,—all come in order, as the visitor to the Ford assembly plant sees the little touring car grow from a jumbled bunch of pieces into a real modern Henry car.

The First Passenger

The work of assembly proceeds, the car, as it is added to, passing up the line, slid on two rails very much like railroad tracks. The control shaft, the front axle assembly,—the latter done in a separate corner by itself,—the rear axle and differential assembly, the work of putting the rear axle on the frame, about this time this one may begin to see the end of the Ford's trip through Mr. Frazar's assembly plant. The motor has previously been tested, and is in the car. The dash assembly, horn, coils, steering control are put in and then come the wheels, fuel tank, and finally the body assembly. This last step is done by a boy who, perched in the body, on a chain, gradually is lowered on to the frame of the car. The boy in the Negishi plant thus enjoys the first ride in the new Ford, as some of his companions are always glad to give him a shove along, right up to the point where the Ford, under its own power, may soon be driven out into the yards of the plant for a waiting purchaser.

Six Cars Possible Daily

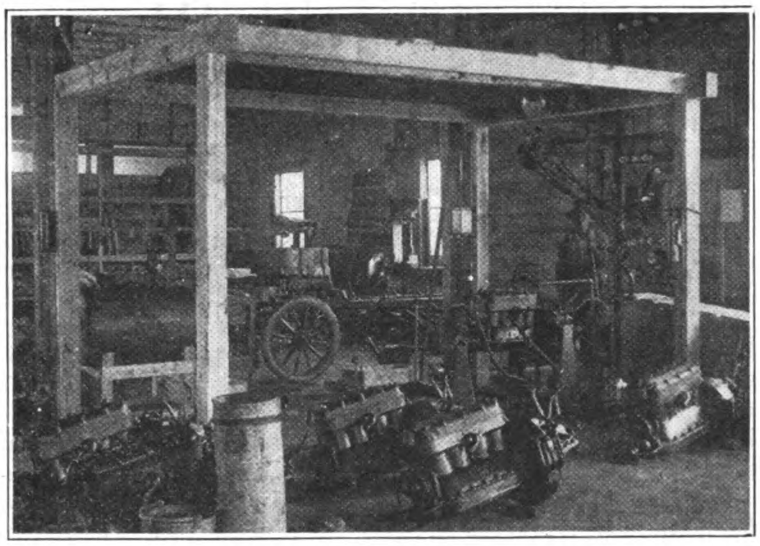
The most recent shipment of new Fords came from New York, by way of the Panama Canal, on the *Choyo Maru*. Some time is frequently taken in getting the cars through the customs, but, leaving this matter out of the consideration, it is remarkable how quickly a Ford can be put together. The present plant represents not only the most complete assembly works but the greatest attempt for speed in assembly that has yet been made in the Orient. The work of the Sale and Frazar Ford agency, in assembling, was carried out in the past at the Sale and Frazar Shops, No. 83 Main Street. But that section of the Sale and Frazar property in Yokohama has been entirely turned over to the assembly of other cars now, the Ford being the king at the Negishi works.

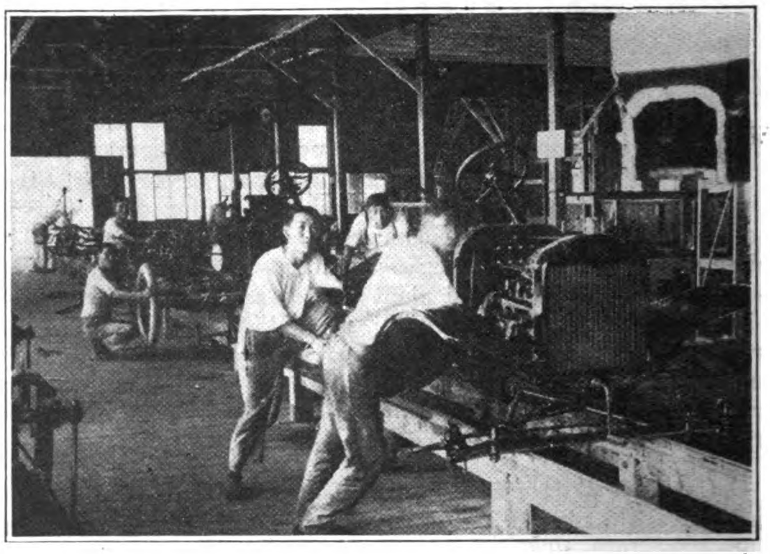
Formally, six cars per day may be assembled at the Negishi plant, the greatest outpost of Ford efficiency in the Orient. Last month was a busy season, and the workers at the Negishi institution were kept at it one of the fatest rates yet made necessary at the new plant.

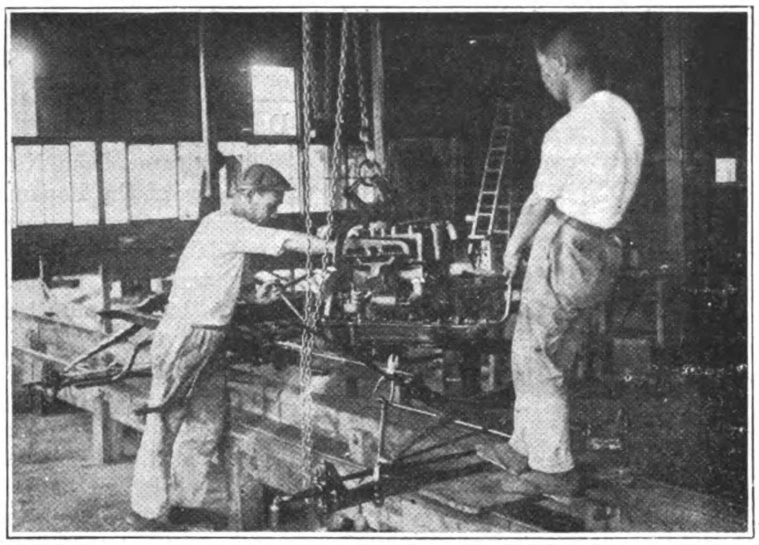
It is a model scene of American industry, this Negishi plant of the Ford outpost. Here the famous American motor car, one hour and thirty minutes in Japan, may be run out, and into the Japanese highway, ready for years of service to the Japanese owner, who, by the way, is as strong a booster of the Ford automobile as the most enthusiastic Ford owner in the United States.

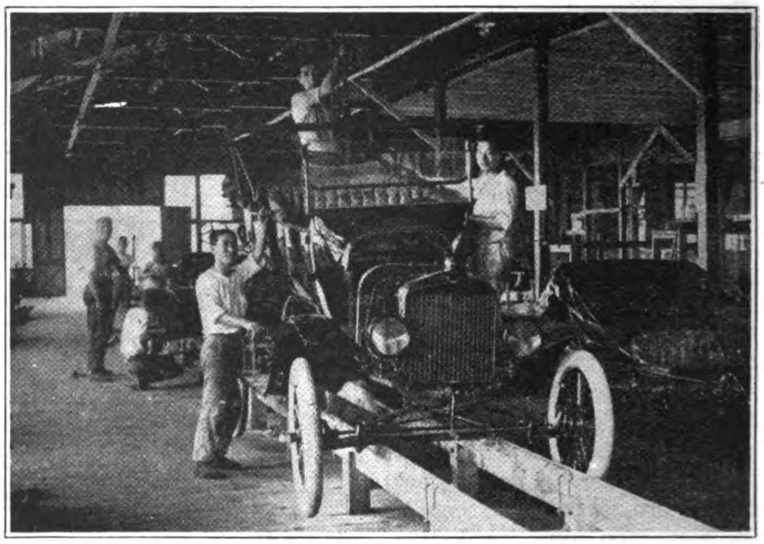
In a country where there are so many beautiful roads, most of which are accessible to motor cars, it will be strange if the business in cars does not increase in rapid fashion. Unlike China where there are but few motor roads, except in the treaty ports where the motorist has really very little scope for much riding, Japan offers much to the car owner and the Japanese are never slow in accepting of opportunities for the enjoyment of a scenic beauty. The Ford assembly plant such as is described above no doubt fills an important place in the development of the motor car business. It is not difficult to foresee the advantages thus offered to a growing industry and to realize its importance in the future.

THE ORIENT'S BIGGEST FORD ASSEMBLY PLANT









New ideas in efficient assembling of Ford Motor Cars were introduced to the Orient when Sale and Frazar, Ltd., opened their modern Ford Assembly Plant at Negishi, Yokohama, last year. The Plant is operating normally now, the output daily, when necessary, being six cars. It is estimated that a shipment of Fords may arrive in crates at Yokohama, and counting time out for Customs troubles, a Ford may be taken from the boat, uncrated, and be set up ready for the road in two or three hours.

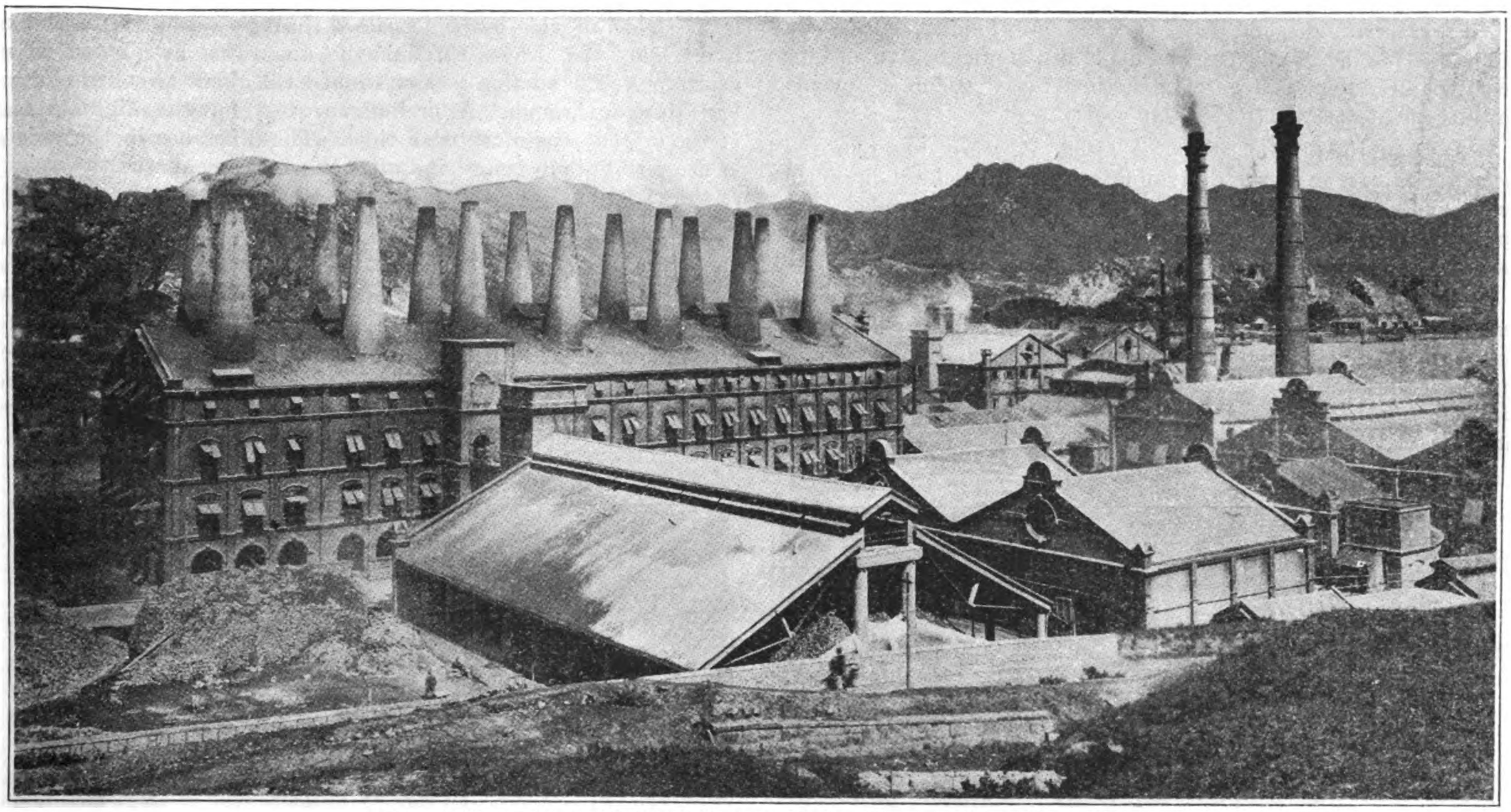
Industrial Bank of Japan

The second half of 1920 witnessed a contraction in the volume of business passing in Japan as the result of the economic disturbances of the first part of the year. Prices of grain and other staple commodities declined and stocks continued to pile up in the warehouses. Efforts were made to relieve business in certain directions, but without success in consequence of the public's incapacity or disinclination to buy. The Industrial Bank of Japan, by reason of its business connections and a great demand for capital, added substantially to its gross earnings, but as hitherto has been the case, the directors concentrated upon strengthening the position of the institution, the need for which was made more urgent by reason of the unsettled conditions. The following table gives the results for the past three half-years :—

	Half-year ended		
	31st Dec., 1919. Yen.	30th June, 1920. Yen.	31st Dec., 1920. Yen.
Net profit	*4,016,800	1,822,000	2,672,200
Dividend p.a.	7%	8%	8%
Carry forward	85,400	88,100	510,300
Capital paid up	35,000,000	44,792,500	45,000,000
Debentures issued ...	232,6 3,300	260,123,000	307,494,100
Reserve	5,971,800	6,124,800	6,374,800
Deposits	44,975,700	39,842,600	34,306,900
Trust funds	40,468,100	46,304,200	31,279,800
Cash	4,579,800	5,687,600	3,252,800
Advances	1,241,200	997,000	1,074,800
Loans	179,768,900	181,866,800	192,564,600
Bills discounted	87,546,900	156,231,900	206,243,300
Foreign bills	7,150,300	9,107,000	2,633,000
Bills bearing interest ...	276,900	3,517,800	2,305,900
Investments	55,969,700	58,489,500	49,407,100
Total assets	407,508,000	486,095,200	517,073,600

* Including Y. 2,728,500 premiums on new shares.

After allowing fully for depreciation charges, the gross earnings for the six months amounted to Y. 19,823,400, against which gross expenses were Y. 17,151,200, leaving net earnings of Y. 2,672,200, against Y. 1,822,000 for the first half of 1920. The dividend payment was maintained at 8 per cent., the remaining profits being allocated to reserves.



View of Green Island Portland Cement Works, Showing the Aalborg Kilns

A Chemical Study of Chinese Portland Cement and Local Raw Materials

A Thesis Presented to the Faculty of Soochow University in Partial Fulfilment of the Requirements for the Degree of Master of Arts, by C. H. Zee, B.S.

PART II

THE essential elements of Portland cement—lime, silica, iron and alumina—are all extremely abundant. In fact they are the four most common elements of the earth's crust. Therefore the raw materials that are theoretically available for cement manufacture are almost infinite in number. But under existing commercial conditions, many things other than chemical composition have to be taken into account, and only a comparatively few combinations are actually used. The chief combinations of raw materials now used may be grouped under four heads : (1) Cement rock in which the four essential constituents exist in so nearly the proper proportions that only a small amount of other substance is required to be added in to make the mixture of correct composition ; (2) limestone and clay, the former furnishing lime, and the latter furnishing silica, alumina and iron oxide ; (3) marl and clay ; (4) blast-furnace slag and limestone.

Of the four groups, cement rock was extensively used in the earlier years. But recently with the improvement of the grinding machinery, a very large proportion of the world's output is made from mixtures of limestone and clay. For example, in 1914, 56.9 per cent. of the American output was of this type. That made from cement rock ranked next, with 28.2 per cent. Here in China, cement rock is reported to have been found in Mohkanshan and many other localities, but limestone and clay are certainly more abundant. Two samples of limestone and one sample of clay were obtained from West Dung-Ding Hill. Chemical analyses were made to determine their percentage compositions. Below are given the methods used and the results obtained.

1. Limestone *

1. *Determination of the Insoluble Residue.*—Sample 2 is distinguished from sample 1 by having a darker color, and being very much harder. A number of small pieces, fairly representing the material, were selected, finely powdered, and passed through a 100-mesh sieve. About 5 grams of the material were then weighed out from a stoppered weighing bottle, and dissolved in an excess of dilute hydrochloric acid. The solution was evaporated to dryness and the mass treated with water and hydrochloric acid. Sample 1 left a very small amount of silicious residue which was filtered, washed, ignited and weighed. Sample 2 left a larger amount of residue with a dark color. It was filtered on a weighed filter, dried and weighed. Then the filter with the residue was burned in a platinum crucible, ignited and weighed. The residue was further treated with a mixture of hydrofluoric and sulfuric acids, evaporated to dryness, ignited and weighed again. The decrease in weight represents the weight of silicon dioxide present in the residue.

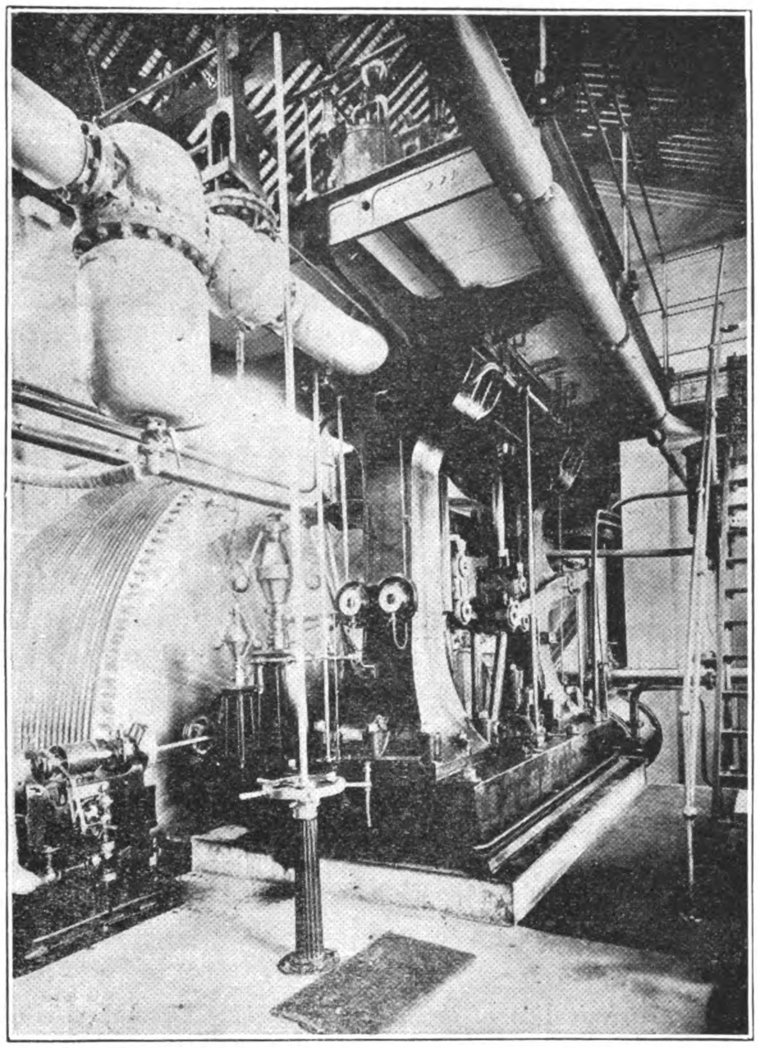
* The methods of analysis are adapted from Evan's "Quantitative Chemical Analysis." Page 70 ff.

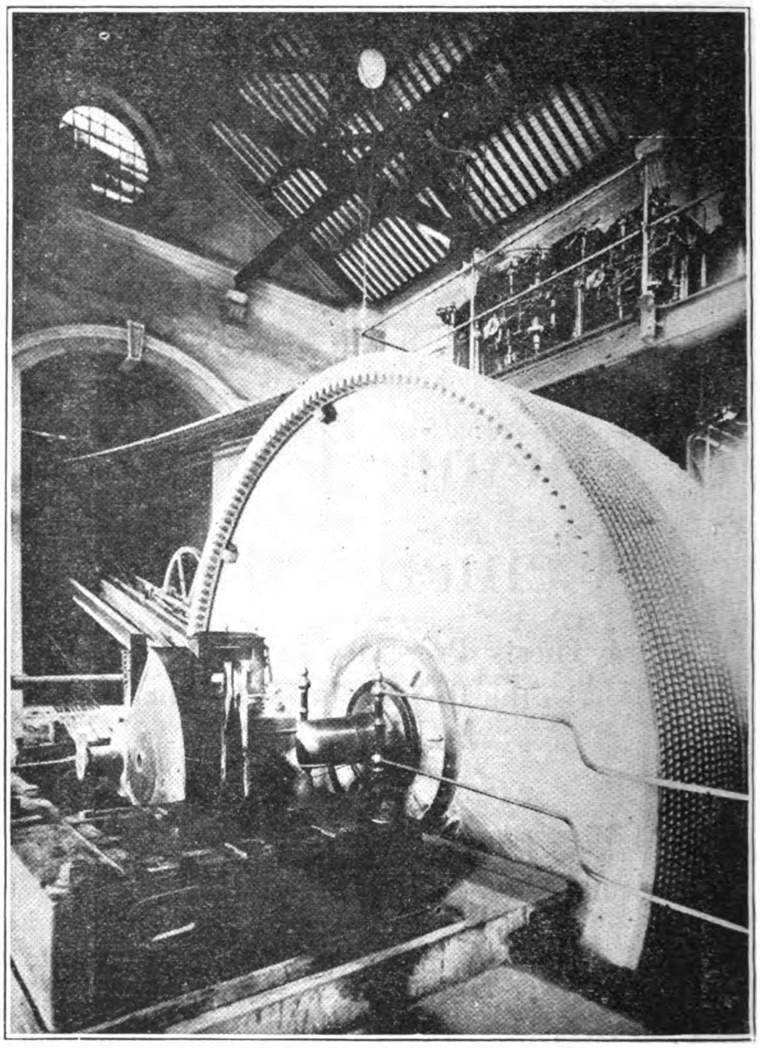
2. *Determination of Iron Oxide and Alumina, Fe_2O_3 and Al_2O_3.*—This determination was made in the filtrate and washings from the insoluble matter. The method was the same as outlined in the cement analysis (Page 598).

3. *Determination of Magnesia, MgO.*—Calcium was removed* from the filtrate from the determination of iron and aluminium by means of ammonium carbonate and ammonium oxalate, and magnesium was then determined, using the methods of B. Schmitz outlined above (Page 598).

4. *Determination of Carbon Dioxide, CO_2.*—The carbonate was decomposed by dilute hydrochloric acid in a flask which joined to a weighed potash bulb attached to a drying tube. Before reaching the potash tube the gas passed through four U-tubes, the first filled with concentrated sulfuric acid, the second with pumice stone, and the last two with calcium chloride. The potash bulb was half filled with a 50 per cent. solution of potassium hydroxide, and its dry-tube was protected by another calcium chloride tube. The sulfuric acid in the first U-tube removed most of the moisture, while the calcium chloride tubes removed the rest. The pumice stone was previously soaked in a saturated solution of copper sulfate, and then dried at 150° C. Its function was to absorb any traces of hydrochloric acid carried over. So the carbon dioxide gas evolved was, after purification, completely absorbed by the potassium hydroxide solution, while any moisture carried off from it was absorbed by its drying tube. The last drying tube prevented any backward diffusion of moisture from the aspirator bottle or outside air. When nearly all the carbonate was dissolved, the flask was heated nearly to boiling, and a current of air, freed from carbon dioxide by being passed through a solution of sodium hydroxide, was drawn through the apparatus by means of an aspirator. The suction was continued till about two liters of air had passed through. A preliminary test for the air tightness of the system was made each time. The difference in the weight of the potash bulb before and after the experiment was the weight of the carbon dioxide absorbed.

5. *Determination of Calcium Oxide or Lime, CaO.*—The hydrochloric acid solution was washed out from the flask used in the carbon dioxide determination into a beaker, and made alkaline with a slight excess of ammonium hydroxide. It was then boiled and filtered into a 500 cc. flask, diluted to the mark, and 100 cc. was drawn out at one time. The calcium was precipitated as the oxalate and determined volumetrically as outlined in the cement analysis (Page 598).





GREEN ISLAND CEMENT WORKS

1,000 H.P. Triangular Connecting Rod Type, made by John Musgrave and Sons

Rope Drum of 1,000 H.P. Engine

6. *Determination of Moisture.*—About a gram of the sample was used. It was kept at a temperature of about 150° C., until the weight remained constant.

2. Clay †

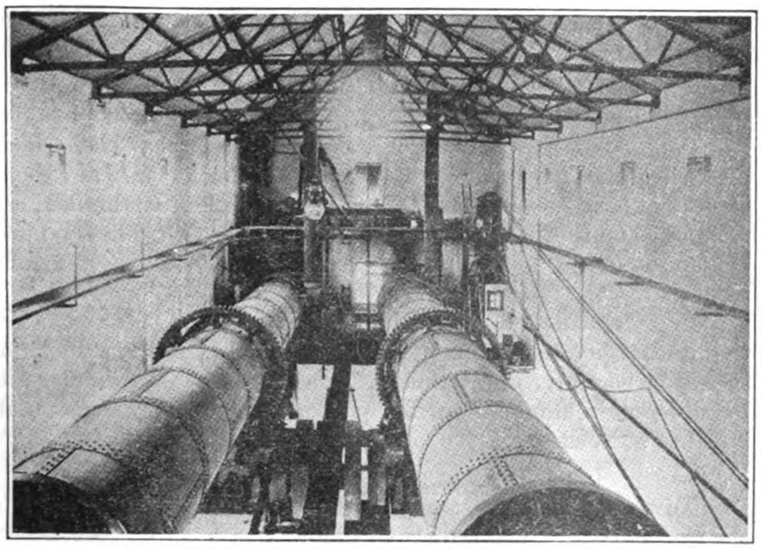
The sample was finely powdered, passed through a 100-mesh sieve and thoroughly dried at 100° C.

1. *Determination of Silica, SiO_2.*—About 0.2 grams of the sample was weighed out from a stoppered weighing bottle into a beaker, in which it was treated with a mixture of 10 cc. of concen-

* Calcium was not determined in this connection, because the quantity present was too large.

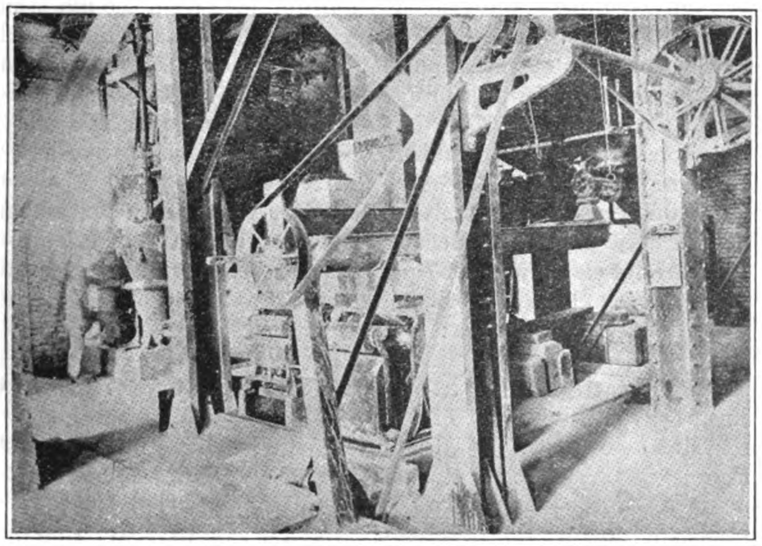
† The methods are mainly taken from laboratory instruction notes.

trated sulfuric acid and 5 cc. of concentrated nitric acid,* and boiled for a few minutes. After cooling, about 70 cc. of water were added, and the solution again cooled. When the undissolved material had settled, the supernatant liquid was filtered off and the process repeated using the residue. The final residue was washed



Green Island Cement Works: Rotary Kilns, 85′ × 7½′

with cold water. Allowing the diluted solutions to stand over the residues was avoided, as the silica in this condition is somewhat soluble in the dilute acid on long standing. The final residue was washed into an evaporating dish, acidified with hydrochloric acid and dehydrated. The procedure then followed was the same as in the cement analysis (Page 598). But after the precipitate had been ignited to constant weight, it was treated in the crucible with hydrofluoric acid and a few drops of concentrated sulfuric acid, evaporated to dryness, ignited and weighed again. This



Green Island Cement Works: Interior of Mill

treatment was repeated until a constant weight was again reached. The difference between the two weights, before and after the treatment with hydrofluoric acid, was the silica, which was driven off as silicon tetrafluoride.

2. *Determination of Iron Oxide and Alumina.*—The residue left over after volatilizing the silica in the above determination was treated with dilute hydrochloric acid, and washed into the filtrate from silica. The filtrate was brought to a boil and the iron and aluminium precipitated by ammonium hydroxide. The precipitate was dissolved and reprecipitated to free it from the salts of calcium, magnesium and the alkalies. The precipitate was again dissolved in dilute hydrochloric acid, and diluted to 300 cc. One hundred cc. of the solution were drawn out, the iron and aluminium were precipitated by ammonium hydroxide, washed, dried and ignited to constant weight. It was weighed as the oxides.

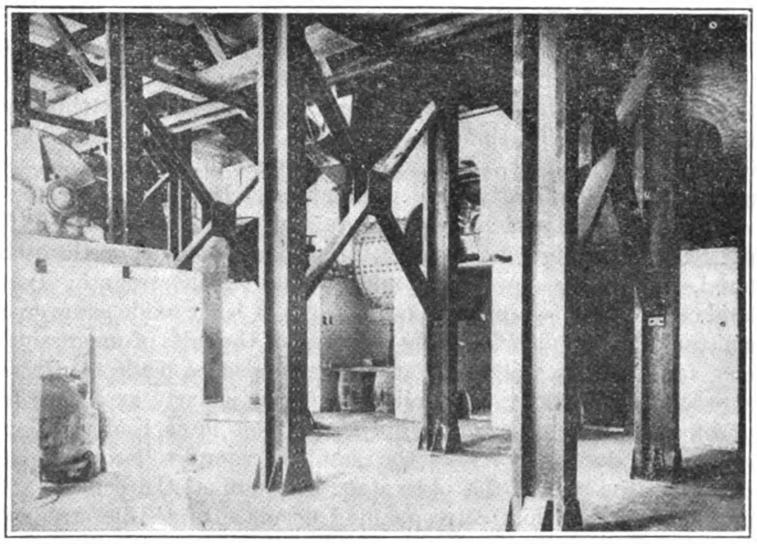
3. *Determination of Iron Oxide, Fe_2O_3.*—One hundred and fifty cc. of the solution mentioned in the last paragraph were used. The method used was the same as outlined in the cement analysis (Page 598). The percentage of alumina was obtained by difference.

4. *Determination of Calcium Oxide or Lime, CaO.*—Calcium was precipitated from the filtrate of iron and aluminium determination as the oxalate by the method as in the cement analysis (Page 598).

5. But the quantity here was comparatively small and the gravimetrical method was preferred. The oxalate was thoroughly washed, dried and ignited strongly over the blast lamp at the highest temperature to constant weight. It was weighed as the oxide.

6. *Determination of Magnesia, MgO.*—The method of B. Schmitz was used as outlined in the cement analysis. (Page 598).

7. *Determination of the Alkalies.*—In making this determination two grams of clay were used. The silica was volatilized by repeated treatment with hydrofluoric acids. The residue was dissolved in hot water plus a little hydrochloric acid, and diluted to 400 cc. with hot water. The aluminium was precipitated from the hot solution by adding an excess of barium hydroxide and boiling a few minutes. The precipitate was washed into 400 cc. water, boiled, filtered and washed. The two filtrates were united and evaporated to dryness. The residue having been dissolved with a little water and heated to boiling, the barium was precipitated by adding an excess of ammonium oxalate. The solution was filtered into an evaporating dish, evaporated to dryness, and heated to a dull redness. Then it was dissolved in a few cc. of water and



Cement Mill

filtered into a weighed crucible. After evaporating very low, a few drops of hydrochloric acid were added and evaporated to dryness. It was then heated to low redness, cooled and weighed as potassium chloride plus sodium chloride.

8. *Determination of Ignition Loss.*—About half a gram of clay was ignited at a bright red heat to constant weight. The loss was calculated as the ignition loss.

*The acid method of attack was used instead of the fusion methods, because of its comparative rapidity, and also because of lack of large platinum crucibles. Where calcium salts are present in small quantities, the acid method is generally satisfactory.

Below is given a record of the results obtained in these analyses.

LIMESTONE No. 1.

	CaO	CO_2	SiO_2	Fe_2O_3 & Al_2O_3	MgO	Moisture
1.	55.93	43.46	0.049	0.0613	0.127	0.208
2.	55.88	44.14	0.049	0.0542	0.157	0.196
3.	55.90	43.93	0.053	0.0560	0.114	
4.	55.62	44.22	0.059	0.0679	0.142	
5.	55.99	43.46				
6.		43.55				
Average	55.86	43.78	0.052	0.0598	0.135	0.202

LIMESTONE No. 2.

	CaO	CO_2	Insoluble* residue	SiO_2*	Fe_2O_3 & Al_2O_3	MgO	Moisture
1.	56.15	43.49	0.171	0.0789	0.0851	0.146	0.0860
2.	55.93	43.62	0.158	0.0783	0.0752	0.154	0.0845
3.	55.97	43 59	0.159		0.0906	0.161	
4.	56.40	43.44	0.168		0.0964	0.142	
5.	56.14						
Average	56.12	43.54	0.164	0.0786	0.0818	0.151	0.0852

CLAY.

	SiO_2	Fe_2O_3	Al_2O_3	CaO	MgO	NaCl & KCl	Ignition loss
1.	49.03	8.76	18.90	7.21	1 02	4.92	13.87
2.	48.93	9.00	18.84	7.05	1.06	4.82	13.45
3.	49.07	8.70	18.68	7.38	1.20		13.53
4.	48.99						
5.	49.02						
6.	49.00						
Average	49.01	8.85	18.81	7.18	1.09	4.87	13.62

9. Conclusions

Cements.—The standard specifications limit the amount of magnesia that may be present in cement to 3.5 per cent. and of sulfuric anhydride to 1.75 per cent. These two substances in each of the three samples analyzed fall within the limits. No. 2 has a contrast with No. 3 in that it contains a higher percentage of lime and a lower percentage of silica. Up to a certain limit it may be said that the more lime there is present, the greater will be the strength of the cement. High lime cements are usually very slow-setting, but they harden rapidly, sometimes reaching their maximum strength in twenty-eight days. But when too much lime is present the cement will fail when tested for soundness. However in a sample such as No. 2, in which the percentage of alumina is so low, 62.71 per cent. of lime is not too much. High silica cements, on the other hand, are usually slow-setting and of good tensile strength. Portland cements containing high percentages of ferric oxide show great resistance to the disintegrating influence of the salts of magnesium, etc., found in sea water. Iron oxide can also be made to replace a part of the alumina with advantage, particularly as a cure for unsoundness. The percentage of ferric oxide in each of the three samples analyzed, especially the first two samples, is quite high. But with the rise of the percentage of alumina, the cement sets more quickly, with a corresponding decrease of tensile strength. Clinkers obtained on burning mixtures high in alumina are very fusible, hard to burn uniformly, and difficult to grind. The percentages of alumina in the cements analyzed are not high, the maximum limit being 10 per cent. As a whole, these samples of cement which we have studied are quite satisfactory in chemical composition.

Raw Materials

Limestones.—As to the raw materials we have studied, the two samples of limestone, though differing widely in color and hardness, are very similar in chemical composition. They are almost pure calcium carbonate with very little impurity. These impurities, being so small in quantity, only a few milligrams of precipitate or residue were obtained from 5 grams of samples, were very difficult to handle, and very closely agreeing results were difficult to get from duplicate analyses. But these impurities will not have any great influence on the cement manufacture. The conditions that will prevent limestone from being suitable for cement manufacture are (1) the presence of magnesium carbonate exceeding 4 per cent., or (2) the presence of silica in large quantities or in the form of chert or flint even in small quantities. These limestones are evidently satisfactory in these particulars; and they are quite suitable for cement manufacture if we can have a sample of clay rich in silica and iron oxide to mix with them.

Clay.—For use as Portland cement materials, clay should meet the following requirements in composition. (1) They should contain at least two and three-tenth as much silica as alumina. (2) Magnesia and the alkalies present should be low. (3) The sand present must be very fine. The clay analyzed meets all these requirements.

In order to produce a cement that is sound, normal in setting and of good strength it is imperative that the raw materials should be correctly proportioned. There are several formulas used by different manufacturers for proportioning the raw materials, but that of Newberry is the most common.

$$\text{Lime} = 2.8 \times \text{silica plus } 1.1 \times \text{alumina.}$$

Now as shown by analysis the percentage compositions of the raw materials analyzed are as follows:

	Clay.	Limestone †
Silica	49.01%	0.052%
Alumina	18.81%	0.06 % ‡
Lime	7.18%	55.86 %

That is, in 100 parts of clay there are present 49.01 parts of silica, 18.81 parts of alumina and 7.18 parts of lime; while in 100 parts of limestone there are present 0.052 parts of silica, 0.06 parts of alumina and 55.86 parts of lime. Now if we apply Newberry's formula, the silica and the alumina in the clay require 2.8 by 0.052 plus 1.1 by 0.06 or 0.21 parts of lime, which, subtracted from 55.86, leaves 55.65 parts available for combination. The silica and alumina in the clay require 2.8 by 49.01 plus 1.1 by 18.81 or 157.92 parts of lime, but as only 7.18 parts are present, 150.74 parts are not provided for. And this has to be obtained from the limestone. Now 100 parts of limestone can furnish 55.65 parts of lime, so the number of parts of limestone that will furnish 150.74 parts of lime may be found from this proportion: 100: 55.65 by 150.74. X is found to be 270.87. This is the maximum number of parts of limestone that may be added to 100 parts of clay according to Newberry's formula.

In our case, however, it seems better to use a smaller amount of limestone than this. Because if we use a mixture consisting of 100 parts of clay and 270.87 parts of limestone, then after ignition, during which all the volatile ingredients are driven off, the mixture would analyze as follows:

	SiO_2	Fe_2O_3	Al_2O_3	CaO	MgO
From 100 parts of clay ...	49.01	8.85	18.81	7.18	1.09
From 270.87 parts of limestone	0.14		0.16	151.93	0.366
Sum	49.15	8.85	18.97	159.11	1.456

Expressing these in percentages, we have

Silica...... 20.71% Iron oxide.... 3.73% Magnesia..... 0.61%
Lime...... 67.02% Alumina....... 7.99%

From this we can see that lime is present in excess, 65 per cent.

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*Silica is a part of the insoluble residue, and is therefore included in it.

Owing to lack of time and reagent the separation of potassium from sodium was not tried. Consequently the percentages of Na_2O and K_2O cannot be stated with precision. But if the alkalies were present all in the form of potassium compounds, the percentage of K_2O will be 2.55 per cent.; and if they were all present as sodium compounds, the percentage of Na_2O will be 1.92 per cent. And the percentage of the alkalies, *i.e.*, K_2O plus Na_2O, must lie between these two values.

†The first sample is preferred, because it is much softer, and consequently much easier to grind.

‡This is strictly a mixture of iron oxide and alumina, but it will practically make no difference if we assume it to be all alumina, the quantity present being so small.

being the limit. In order to reduce the percentage of lime and at the same time not increase the percentage of iron oxide and alumina much beyond 12 per cent., a mixture of 100 parts of clay to 253 parts of limestone seems desirable. This mixture is equivalent to 43 parts of clay to 109 parts of limestone. In this mixture,

43 parts of clay will give ...	21.07	3.09	3.81	8.09	0.47
109 parts of limestone will give	0.06	60.88		0.07	0.15
152	21.13	63.97	3.81	8.16	0.62
		97.68			

Thus we see 152 parts of raw materials will be reduced to 97.68 parts after ignition, if we assume that all the carbon dioxide and combined water are driven out. But if the product still retains about 25 per cent. of carbon dioxide and combined water, as shown in the percentage compositions of the Chinese and the American cements mentioned above, then the number of parts of each constituent left after the ignition of 152 parts of raw materials will also represent the percentage of that constituent present in the product. And these numbers shown in the last table represent evidently a Portland cement mixture of correct chemical composition. Of course it is by no means an ideal one. It would be a better mixture if the percentage of alumina were lower.

Thus we conclude that the samples of limestone and clay analyzed will give a moderately good Portland cement mixture so far as chemical composition is concerned. At the same time we must not suppose that chemical composition of the raw materials is the only thing to be considered in the establishment of a Portland cement industry. The physcial qualities of the raw materials are important, and many other things, such as the fuel supply and the condition of the market, all need further consideration.

Customs Report on Yunnan

THE British firm of Brunner, Mond & Co. established an agency at Yünnanfu during the summer. A French firm, La Compagnie Générale d'Extrême Orient of Paris, opened an agency at Mengtsze during the autumn. Towards the end of the year the Straits Trading Company moved their premises from Mengtsze to Pishihchai, and hopes are expressed that the negotiations for the purchase of tin ore for export to the Straits will at last be successful.—At Kokiu the Hsi Wu Kung Ssu had a water supply laid on by Shewan, Tomes & Co., who had water brought from a distance of 12 *li* from Kokiu to Malake. New machinery and boilers were installed for this purpose at the mine. The company has engaged the services of two American experts, and improvements in the refining of tin are expected.—The construction of the Ko-Pi Railway, which is to connect Kokiu with Mengtsze and Pishihchai, progressed during the year. The part of the line running through the mountains, which is considered to be a work of engineering art, will be finished, it is said, at the end of March 1921, and through traffic will start in May. In November trains could reach Chatien, 30 *li* from Kokiu.—The Yünnanfu wireless installation, mentioned in the Trade Report for 1919, was put up in the autumn in the railway enclosure, this being the first of six which had been ordered from the French government. The other five installations will be for Tengyueh, Hokow, Mengtsze, Talifu and Kwangnan.—An electric-light plant was imported during the year for Linanfu, and a similar plant was expected early in 1921 for Amichow.—At Yünnanfu two hosiery factories were established in the summer, but the output was reported to be still small.—A company, styled the Jih Hsing Company, with a capital of $100,000, was also formed in the autumn, with the object of reviving the tea trade of the province and of causing improvements in the manufacturing methods. The Yunnan government, under T'ang Chi-yao, attempted during the latter part of the year to interest wealthy Chinese from the Straits Settlements in the province. Two Cantonese merchants arrived in November, having in view improvements and the developing of the provincial industries. They were authorized to open a bank, the Mining Bank (礦業銀行), with a capital of $5,000,000 and to issue their own bank-notes for that amount. They also founded an industrial company, the Wan Shang Kung Ssu (萬商公司), for industrial and mining purposes. One of these gentlemen, who is a mining expert, is said to have discovered tin ore at Shuitang (水塘), near Iliang (宜良), at Tachwang (大莊), and at Tsaopa (草壩), near Pishihchai. Rich ore is said to occur at the first-named locality, where mining operations have been started. With a government which will grant a respite from the war with the neighboring provinces, which will re-establish order and guarantee some security for life and property throughout the country, and will enforce strict legislation against the destruction of the forests, there is little doubt that Yunnan, with its mineral treasures and mountains so well adapted for the growing of timber, might easily become a prosperous and wealthy country and that it would supply the rest of China with timber and metal in sufficient quantities to make the republic independent as regards these commodities. At present the mountains of Yunnan continue to be ruthlessly ruined by indiscriminate and mischievous burning of grasslands suitable for grazing and by the reckless destruction and burning of forests, of new woods trying to recover from previous devastation, and of precipitous hillsides which are absolutely unsuitable for anything but the growing of forest trees. To anyone traveling between Haiphong and Yünnanfu by rail the contrast between Tonkin, with its magnificent, well-kept forests and rich hill plantations, and poor devastated and ruined Yunnan is striking. Unless severe laws against the destruction of the forests are promptly enforced, in a very few years, the last of her forests having disappeared and taken away with them the remaining chances of an impoverished land to recover itself, South Yunnan will resemble the arid deserts of North China, swept by droughts, floods, and famine and an eyesore and a drain on the resources of the rest of the country.

The Oilfields of China

At the present time oil is contesting with coal for precedence in international importance. In these circumstances it is matter for little surprise that increased attention is again being turned to China's great resources in oil, and several projects are under consideration for the more rapid development of such resources. This enterprise is to be found in America, Japan and Great Britain. The first-mentioned country has already spent large sums in expert investigation, and there is a considerable amount of American oil machinery in China. Present plans are based on the favorable reports available just prior to the outbreak of the war. Those reports, it may be recalled, concerned the petroleum rocks and results of borings on the south of the desert Gobi, at the base of the Nanchang Mountains in the province of Kangsu, at a distance of 20 miles from Schangte-King-pou and near the River Tscke-King-sia.

The petroleum wells of North Shansi, which for many years supplied wide areas of the country with illuminating oil, are the best known but possibly not the richest Chinese oil resources. The petroliferous formations that distinguish the Trans-Caucasian oil-fields, extending from the Crimea into Persia, Burmah, Chinese Turkestan, Kangsu and Shensi, are known to cover a vast range, and it is contended that some of the richest gushers will in the future be developed in the Chinese section.

In the past the progress of oil production has been unsatisfactory and spasmodic. A very great stimulus is now being applied to development. The world-wide contest over oil has already touched China, and in view of the plans now being advanced, the exploitation of the country's rich deposits rank amongst its most important projects.

Mining Development in Korea

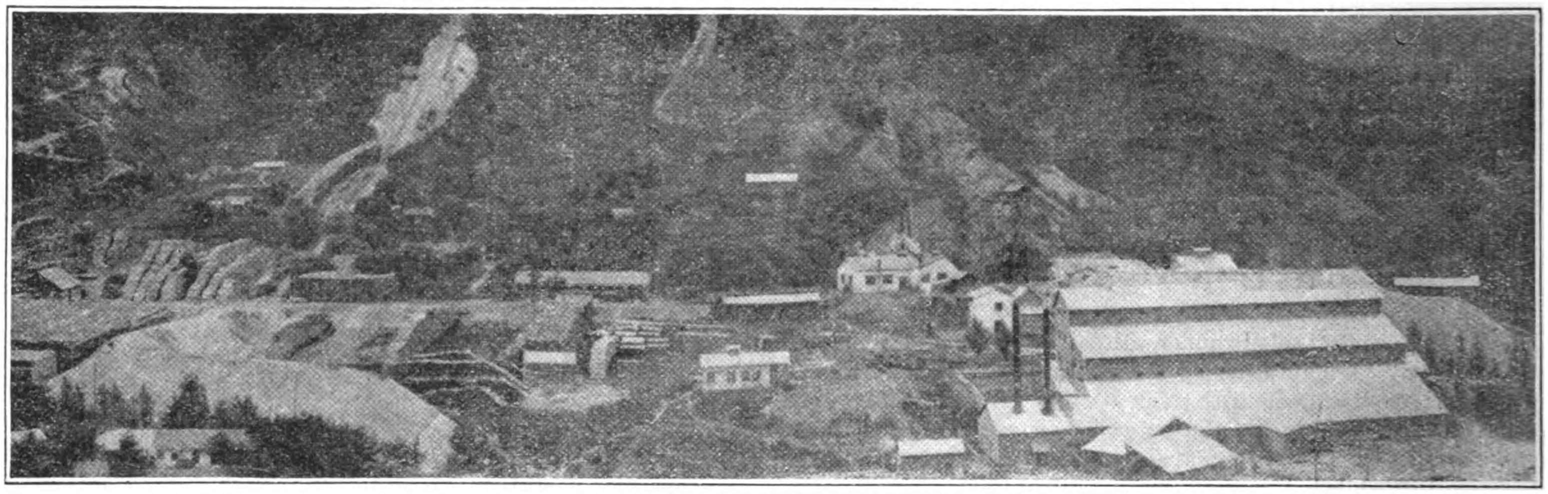
Efforts to Revive It. Some Interesting Information

THE mining situation in Korea at the present time is giving rise to some discussion as to the future by those who are interested, and these do not appear to be a few. It will be remembered that during the war in Europe the mining industry in Chosen enjoyed an unprecedented season of prosperity, the cause being the great demand for Tungsten, iron and other minerals so valuable in the manufacture of war material. As a consequence many mines all over the country were exploited. With the signing of peace this unusual demand ceased, gradually, of course, until now many hundreds of mine-owners have closed their workings. Inactivity at the present time is even more marked than it was before the war. It is generally recognized that it will be impossible to recover such prosperity as was enjoyed during the war, but those interested are questioning the improbability of being able to raise the mining business to a normal level if not to a flourishing one. The matter has long been the subject of careful study by a commission of more than sixty gentlemen of the Chosen Mining Association. These gentlemen have now concluded their inquiries and have published the result of their work. According to their conclusions there are five special causes working against the revival of the industry which must be eradicated if its development is desired. Briefly they are as follows:

1. Comparative indifference of the government to the development of the industry.
2. Comparatively heavy obligations mine-owners have to shoulder.
3. The same with prospectors.
4. Lack of sufficient capital and expert knowledge.
5. The high price of motive power, which is chiefly obtained by the burning of coal.

Efforts will be made by the Chosen Mining Association to remedy all these defects. It is hoped that success will follow their activities and that the government will assist them as much as possible. A reform that will do much to bring about the desired result is in reducing the taxes and fees to which mine-owners are at present obligated. Where any industry is in its infancy, protection and encouragement are necessary if it is to survive.

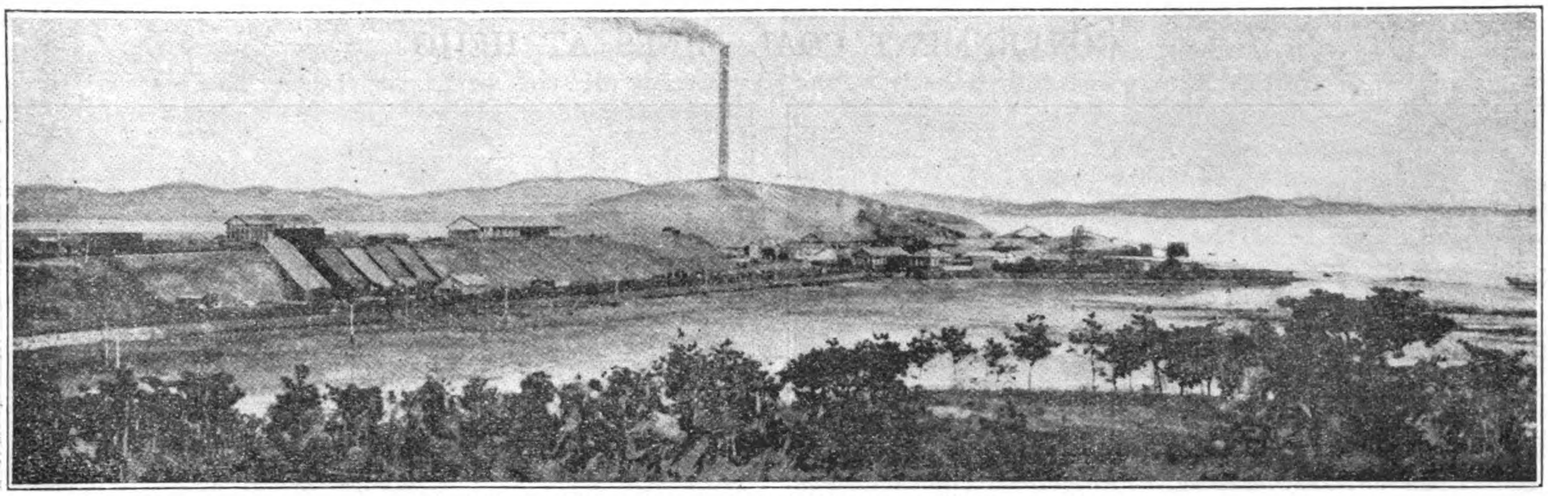
A very interesting article on mining in Korea written by T. Hoshino, manager of the research department, Bank of Chosen, is so informative that it is reproduced.



Unsan Gold Mine of the Oriental Consolidated Mining Company

PART I

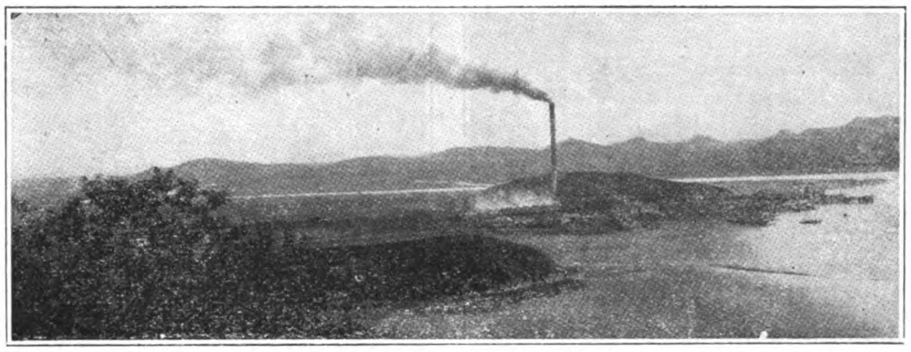
Foreign Activity in Korean Mining Field.—Nature has stored in the Peninsula of Chosen a good many kinds of precious and useful minerals in goodly quantity, but they long remained untouched for the most part, and when work on them was started it was mostly by foreign hands. Before that time there was no mining to speak of. Foreign activity in the peninsular mining field dates back to the year 1896 when a concession was granted to Mr. James R. Morse, an American, in Unsan district, North Pyung-an province, for mining purposes. The grant thus secured induced people of his own and other nationalities to make similar applications, and the result was that two concessions were made to Russians in North Hamkyung province, one to Germans in Kangwon province and one to Englishmen in South Pyung-an province, all of which, however, were later abandoned by the concessionaires, and the mines actually in the hands of foreign concessionaires at the beginning of the new régimé were, besides the above-mentioned Unsan mine, Suan mine in Whanghai province conceded to Englishmen, Chiksan mine in South Choongchung province to Japanese, and Changsung mine in North Pyung-an province to Frenchmen, of which that at Unsan alone was being operated, the others not being ready to start actual mining work. Unsan mine was operated by an American syndicate, called the Oriental Consolidated Mining Company, incorporated under the laws of West Virginia, U.S. A., with a capital of $5,000,000, and paid annually Y.25,000 to the Korean government as royalty. Its prosperity may be gathered from the fact that, up to June 31, 1908, the total output from the mine amounted to $10,701,157, and, that for the single business year ending February 1, 1909, reached $1,716,104 in value. The above-mentioned mines were all gold, and, in fact, foreign activity in the Korean mining field was practically confined to gold then as it is now. But other minerals were not entirely untouched. The rich coal beds in the neighborhood of Pyengyang were leased to a French firm, Messrs. Rondon, Plaisant at Cie., by the imperial household, and another company (a Korean and American partnership) was working coal at different places, all paying the imperial household 25 per cent. of the profits as royalty. The imperial household is even said to have furnished Y.300,000 to each company as part of its capital. Nor were the Japanese excluded from the field. The iron mines of Chai-ryung and Eun-yul, near Chinnampo, were worked by three Japanese as agents for the imperial



The Kuhara Mining Company's Gold Smelter at Chinnampo, Korea

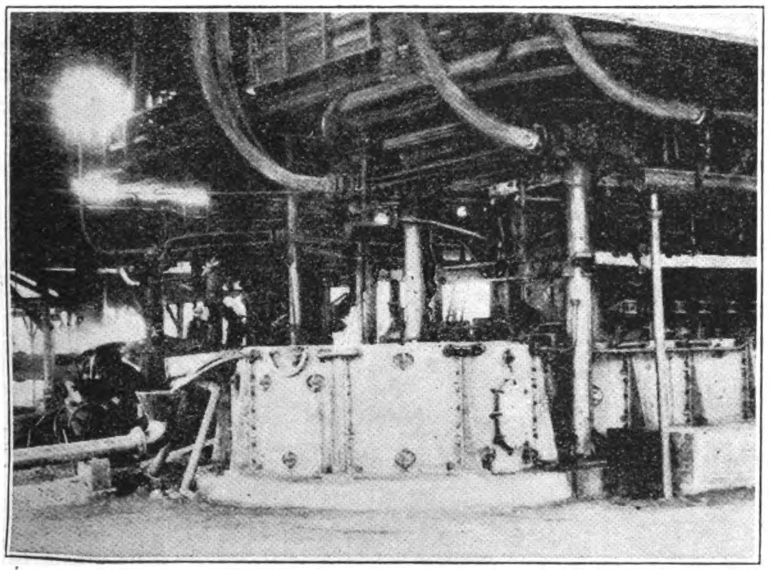
household. Such competition for mining privileges by foreigners lasted for many years, and, though not unaccompanied by some evils, proved after all a stimulus to the industry.

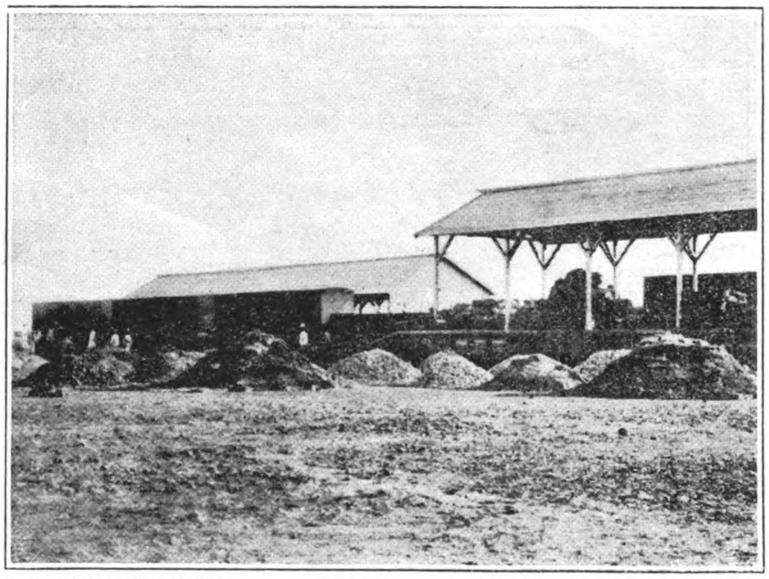
But the mining administration in Korea was extremely ill-managed, deeply corrupted by bribery, favoritism, and the oft-mentioned overlapping of the functions of the imperial court and the government. While mines were under the control of the minister of agriculture, commerce and industry, concessions were often granted secretly to Koreans or foreigners by the emperor without consulting the cabinet. In some cases a concession granted at one time was revoked at another without good reason or compensation, and wantonly bestowed upon another. Not infrequently the same concession was granted to different parties, causing dispute and litigation. Then the mining-tax was collected not only by different departments of the state but also by the imperial household itself, and often twice over, while the local authorities also imposed an arbitary tariff. Under such circumstances no healthy progress of the mining industry could be hoped for.



Another View of the Kuhara Smelter at Chinnampo

New Mining Laws.—On the establishment of the Japanese protectorate in 1905, steps were taken to correct the unsystematic manner in which the mining administration was conducted, and laws concerning mining proper and placer mining were enacted and put into force on September 15, 1906. By these laws it was provided that, (1) all state mines were to be brought under the control of the minister of agriculture, commerce and industry, to whom application for concession was to be made in accordance with the provisions of the laws, (2) all mines, the ownership of which could not be definitely established, were made state property, (3) mining districts were to be of fixed extent, and mining was prohibited in certain localities, (4) in case of necessity private lands were made liable to expropriation, (5) full protection was extended to mining concessions, and cancellation of such concessions could be made only in accordance with the provisions of the laws, (6) concession rights were made the object of transfer by sale, gift or succession, or of mortgage, (7) taxes were to be levied on mining products and districts, and fees charged for concession, (8) in case of several applications foı the same concession



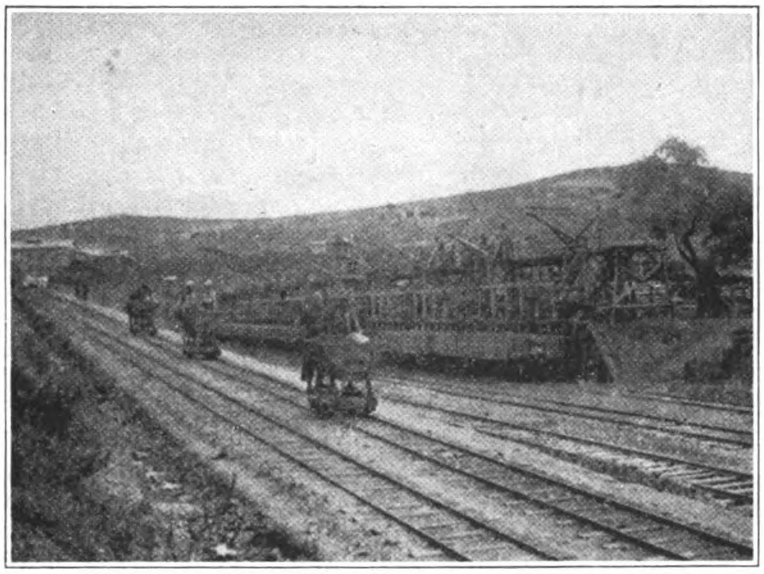


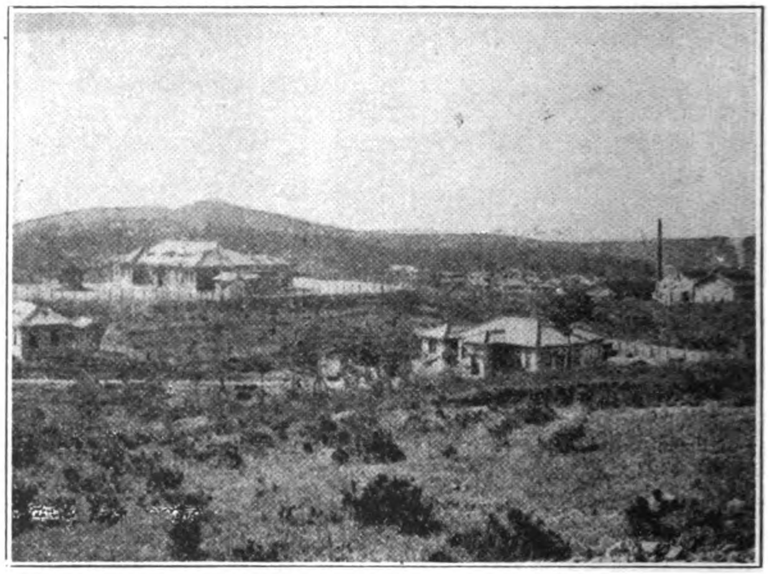
KUHARA SMELTER AT CHINNAMPO

Smelting Furnace with Water Jacket

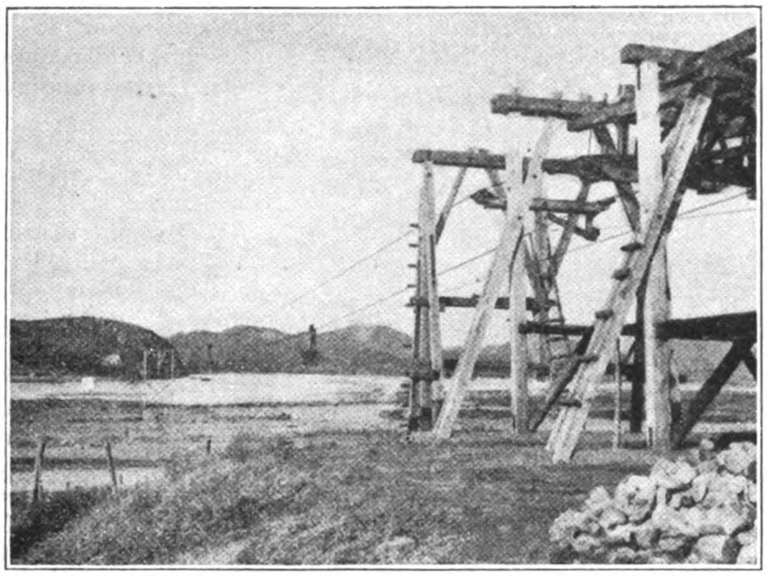
Railway Unloading Ore Direct to Smelter

GOVERNMENT COAL MINES AT HEIJO



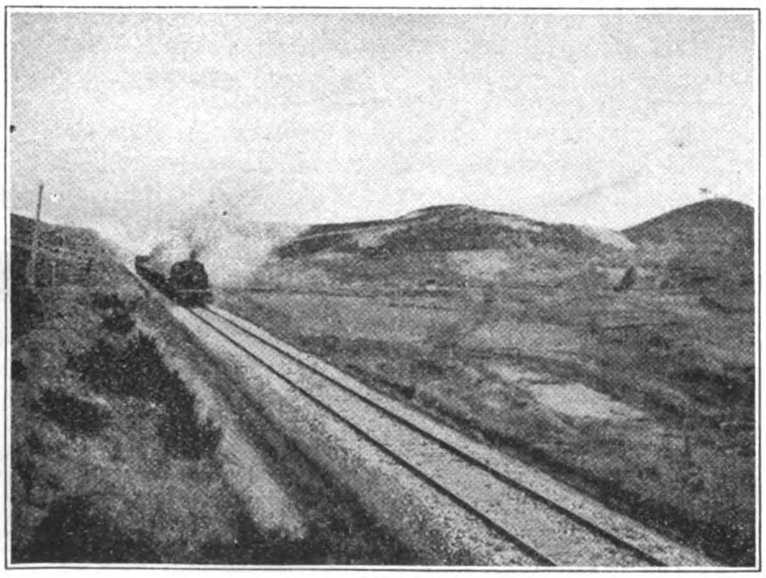


Government Coal Mining Station at Jido, near Heijo

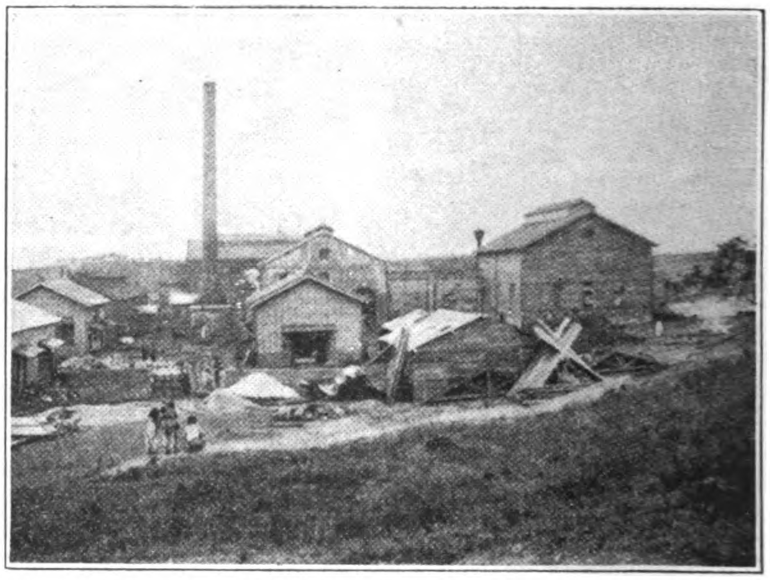


Aerial Tramway

Interior of Mine



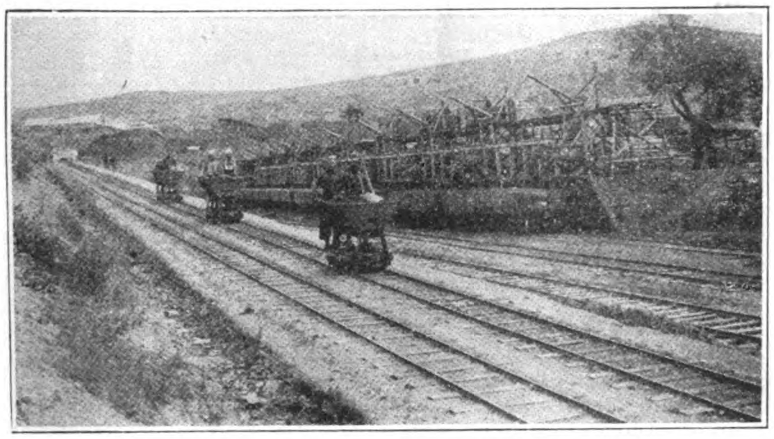
Railway Line to Heijo Coal Mine



Heijo Mine Bricquette Factory

the grant was to be made according to the priority of application, (9) boundaries of mines belonging to the imperial household were to be redefined and publicly announced, and (10) any matter relating to foreigners in executing these laws and regulations was to be referred to the resident-general for his consent.

Enacted to meet urgent needs the laws left much to be desired, and an amendment was made as early as August, 1907. This was, however, only the beginning of a series of amendments sub-



Heijo Coal Mine, Loading Station

sequently made. In fact, the history of the mining regulation covers the whole period between then and December, 1915, when the last mining law was promulgated.

Prince Ito, the first resident-general, seems to have been well-disposed towards foreign investment in mines in the country. To some Koreans who regarded, not without reason, foreign mining enterprises as the spoliation of the wealth of the country, he explained that these undertakings were doing good to Korea as they gave work to many Koreans, and the gold taken by them was sold in Japan and minted there ultimately to return to Korea in the form of coin. More substantial aid was given by exempting from duty all machinery, implements, and other necessities for mining purposes, and by remitting the export duty on copper and concentrates of gold, silver and copper (gold and silver bullion or coin being already free of duty). The forestry law was also revised with a view to affording facilities to the industry. In consequence, at the end of the protectorate régime, the list of concessions made to foreigners showed American concession-holders to be 4 corporations and 4 individuals; English, 2 corporations and 1 individual; French, 2 individuals; Russian, 1 individual; Italian, 1 individual; and, in addition, there were several held by Japanese and Americans jointly, or by Koreans and Americans. The aggregate area of the mining districts thus conceded reached 269,566 acres, these being chiefly gold mines, followed by gold and silver mines, graphite, copper and coal in order.

But the annexation changed the situation in this matter as well as in many others, and, with a view to securing uniformity of laws throughout the empire, a mining law was enacted in December, 1915, and put into force on the 1st of April, 1916, to replace the old law enacted in 1906. The main points of change were (1) the prohibition of foreigners from acquiring new mining permits in Chosen, except in the case of a corporation organized by foreigners as a Japanese legal being, (2) the addition of 12 important minerals, such as tungsten, molybdenum, chromium, etc., to the list of mining products subjected to the mining law, (3) the recognition of a right *in rem* in the mining right to which the regulations concerning immovable properties are applied, and (4) the application of the law of expropriation of land to expropriation and use of those lands necessary for mining operations. But the mining concessions granted to foreigners by the former Korean government, and the mining rights acquired by foreigners according to the old mining regulations were strictly respected, though those applications for mining permits filed with the authorities by foreigners according to the old regulations and not granted at the time of the enforcement of the new regulations were all rejected.

Government Mining Undertakings.—Along the Taidong River in the neighborhood of Pyengyang are rich veins of anthracite coal, the extent of which is about 32 miles in length and 7½ miles in width. Here the government established, as early as 1907, its own coal-mining station which was placed under the supervision and control of the minister of agriculture, commerce and industry, and the budget for 1908 contained an item of Y.300,000, for current expenses and new equipment for this institution. The following year, in order to facilitate the transportation of the coal from the mine, a railway for a distance of about seven miles was built, and for this and other expenses Y.150,000 was appropriated by the government. Again, in 1911 a further extension of the work was made at a cost of Y.760,000. The products of the mine are mostly supplied to the Tokuyama Coal Briquet Factory of the Japanese navy.

The iron mines of Chai-ryung and Eun-yul in Whanghai province were also placed under government control in December, 1907. But, in this case, the government did not work the mines but appointed agents to conduct the mining operations. From the very beginning the products of these mines were wholly supplied to the Edamitsu Iron Foundry of the Japanese government, so it was found expedient to transfer their management to the Japanese foundry altogether. They are now the chief suppliers of iron ores to the above-mentioned government foundry.

Japanese Entry into the Field.—Japanese activity in the Korean mining field, apart from the government undertaking above mentioned, may be said to date from about 1911 when some Japanese mining magnates, who had hitherto held back from any activity in the peninsula on account of its unsettled state, at last entered the arena. The famous Mitsubishi firm purchased in July, 1911, iron districts covering 1,637 acres in Kyumipo, Whanghai province, and drew up a scheme to establish a large pig-iron foundry there. Another great firm, the Mitsui, obtained in April,

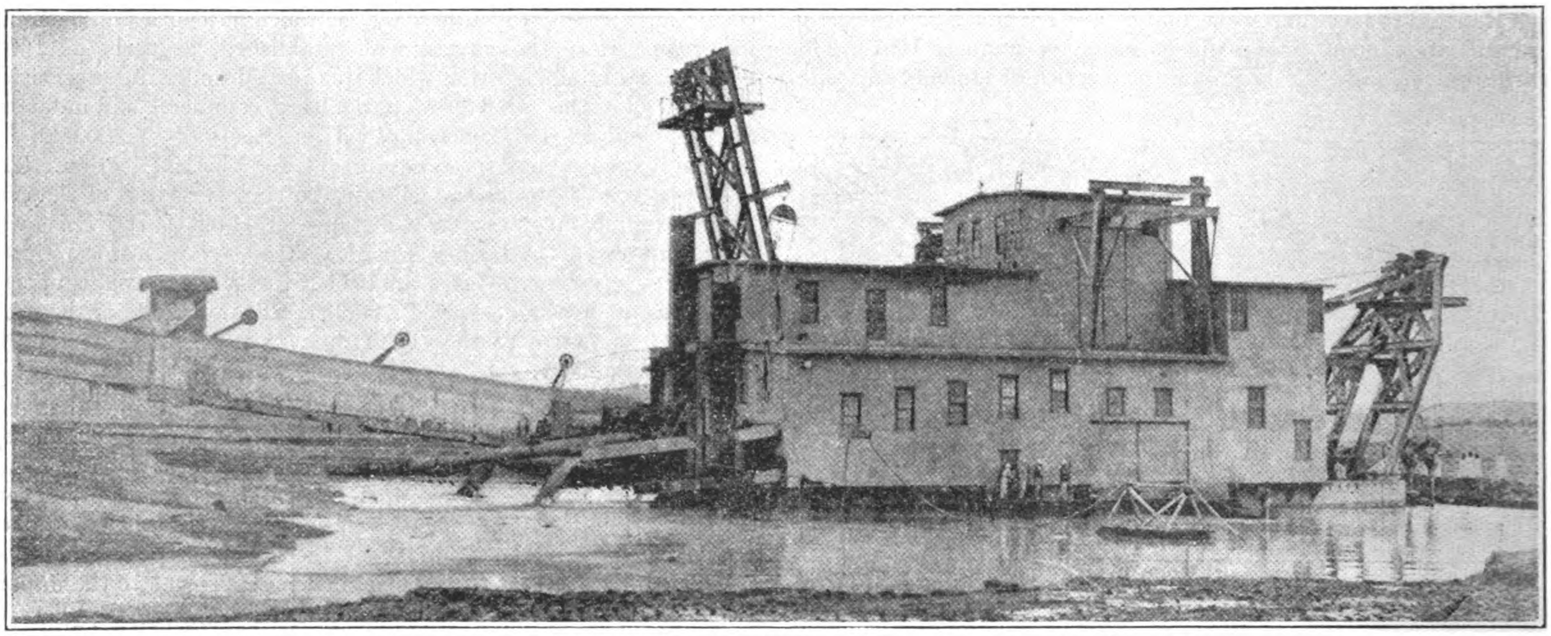
Iron Mine in the Inritsu District of Kokai Province, Supplying Ore to the Japanese Government Steel Works at Wakamatsu

1912, an iron mining permit extending over 1,601 acres in Kaichun district, South Pyung-an province, and commenced work the following year. The well-known copper magnate, Mr. Furukawa, obtained in April, 1912, a concession to mine gold over an area covering 10,014 acres in Koosung district, North Pyung-an province, and began experimental working the same year. About the same time the Meiji Mining Company obtained an important coal-bearing

concession extending over 776 acres in Anju district, South Pyung-an province, while the Fujita firm of Osaka, obtained that of a zinc mine covering 36 acres in Yung-byun district, North Pyung-an province, and started operating it immediately.

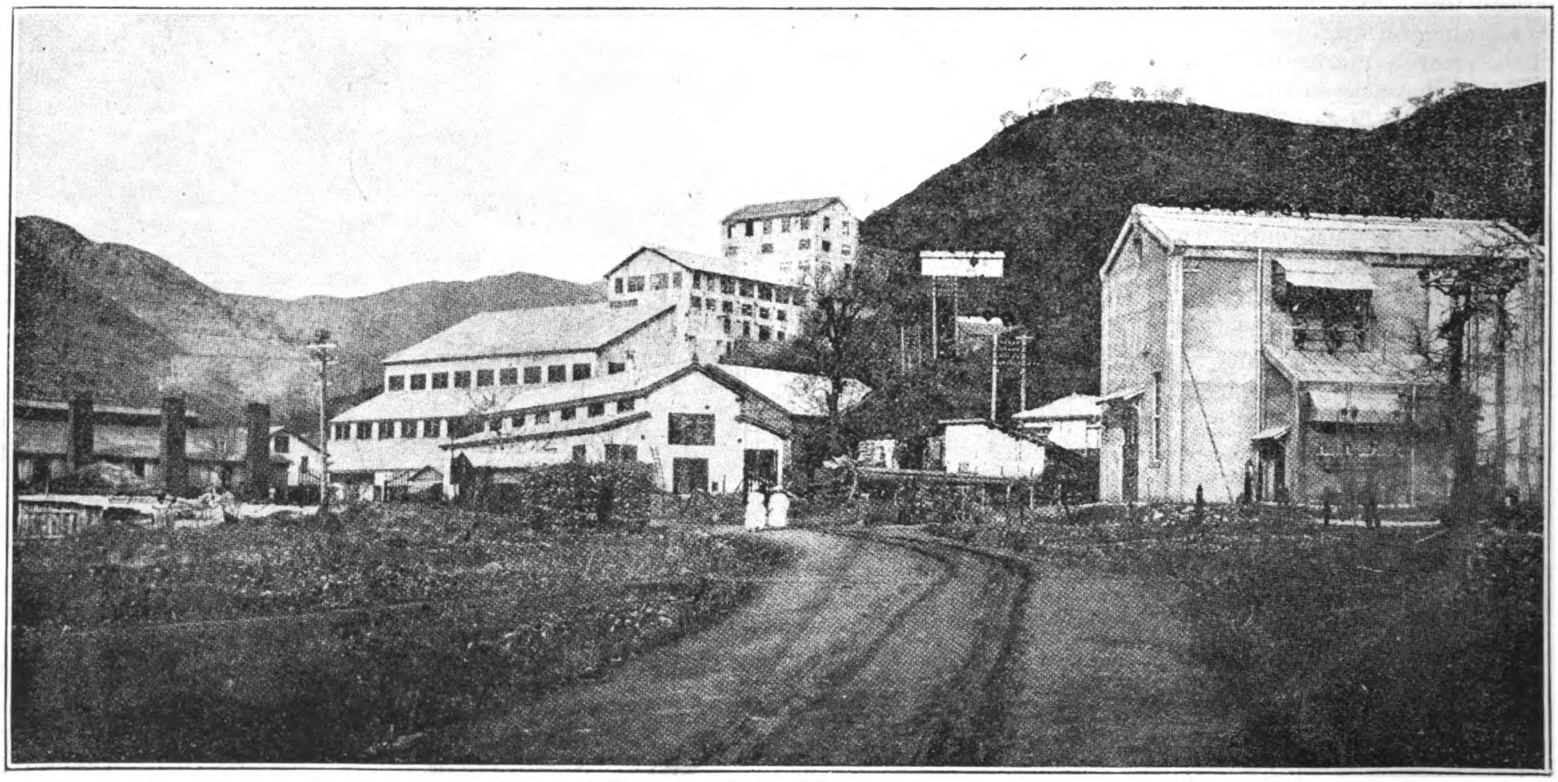
PART II

Mining Development in General.—The development in mining has already been described in Part I incidental to the description of the mining laws and of the various measures adopted for its development. As has already been observed, prior to the annexation mining in the peninsula was for the most part conducted by Westerners, and gold was the only metal mined on a large scale. After the annexation, Japanese began to play an important part in Chosen's mining field, and, while the best and largest gold mines are owned by foreigners, most other minerals are now being mined by them. The Mitsui, Mitsubishi, Furukawa and Fujita companies made their way into the peninsula, and mining enterprises on a large scale began to be set on foot in all parts of it. Indeed, the few years following the annexation formed a turning-point in the mining history of the peninsula. Japanese miners followed



American Gold Dredge built by the New York Engineering Company at Chicksan, Korea

Thus it will be seen that the gold fields, so far known, being already occupied by men of other nationalities, Japanese activity was mostly exerted in other directions, principally coal and iron. These Japanese enterprises may well be said to have revolutionized the industry in question, for they are being conducted on an exceedingly large scale. The Mitsui Mining Company above referred to built a light railway from their mines to Shin-anju Station, a distance of about 20 miles, for the transportation of iron ores. An account of the development of these and of the other mining institutions established in more recent times, together with the mining boom consequent upon the great war, will be given later on.



The Tui Mi Chung Mill and Power Station of the Suan Gold Mine, Korea

by Japanese capital came and explored the country and vied with each other in obtaining mining permits, some with the desire of working them, others without any such purpose but with the idea of speculating in the mining rights thus obtained. The government took the policy of granting permits only to those who really desired to work them, a measure which inevitably called forth much adverse comment but nevertheless proved highly beneficial to the healthy development of the industry.

Increase in Number of Mines.—The number of permits thus granted annually is shown in the following table :—

Year	Permits to Japanese	Koreans	Foreigners	Total
1910 ...	... 124	161	9	294
1911 ...	... 190	207	5	402
1912 ...	... 196	121	9	326
1913 ...	... 207	135	10	352
1914 ...	... 214	93	1	308
1915 ...	... 205	157	18	380
1916 ...	... 422	308	74	804
1917 ...	... 763	461	—	1,224
1918 ...	... 621	367	—	988

It is hardly necessary to point out that the sudden increase in the mining permits granted in and after 1916 was due to the mining boom consequent upon the European war. At the end of 1918 the total number of mining permits in force and mines in operation, with their respective acreage, were as follows :

	No. of Concession	Area
Mining permits given ...	3,204	1,070,437 acres
		361.2 miles*
Mines in operation ...	534	342,955 acres
		58.1 miles*

Remarks: This table does no include four government mines and Unsan mine. *This represents the length of river beds for placer mining

Thus it will be seen that, of the 3,204 mines covering an area of 1,070,437 acres for which permits were given, only 534 mines covering 342,955 acres, or less than 17 per cent. of the number of mines, and 32 per cent. of the aggregate area, are being worked.

Gold.—Chosen alone produces nearly the half the total production of gold in the Japanese empire. The highest output on record was Y. 15,471,545 in 1916, the last year unaffected by the deteriorating effect of the war on its production. Until that year the production was constantly on the increase, and was one of the largest items of export, being second only to rice.

It has already been observed how the two largest gold mines in the peninsula, the Unsan and Suan mines, passed into alien hands. They are still the largest, and both are now worked by Americans. The latest report gives the output of the former at Y. 3,250,000 and that of the latter at Y. 3,730,000. The Changsung mine, worked by a French company, and the Chiksan mine, owned jointly by Japanese and Americans, came next with an annual output of Y. 850,000 and Y. 1,000,000 respectively. Thse large mines are provided with stamp-mills of the most advanced type, and some have a cyanide plant, while the Unsan mine alone employs 2,000 hands. Smaller mines, both vein and placer, are mostly worked by Japanese and Koreans. Of late the famous Kuhara firm has established a large smelter in Chinnampo where gold ores purchased by the firm are smelted. By the establishment of this smelter, not only have the small miners, lacking proper appliances, been greatly facilitated in their mining operation, but sulphide gold ores, in the reduction of which both the amalgamation and the cyanide process failed, can now be dealt with successfully.

Many gold mines have since been discovered, of which one in Koosung worked by the well-known Furukawa firm and the other in Naksan worked by a Mr. Kobayashi are notable ones. The government is now prospecting three mines at Sangju, Wiju and Shin-heung, all of which have proved hopeful. The war has thrown a great obstacle in the way of gold mining the world over, in the form of dearth in mining materials and labor, while the value of its production has remained the same, and Chosen has been no exception to this. But now that the war is over and the effects it has produced are disappearing one after another, not only is the recovery of its old prosperity merely a matter of the near future, but its progress after that is expected to be something extraordinary.

As a bank of issue, the preservation of gold is of vital importance to the Bank of Chosen. For that purpose the bank is provided with a bullion department, and in ordinary years over 85 per cent. of the total gold output in the peninsula is collected by it.

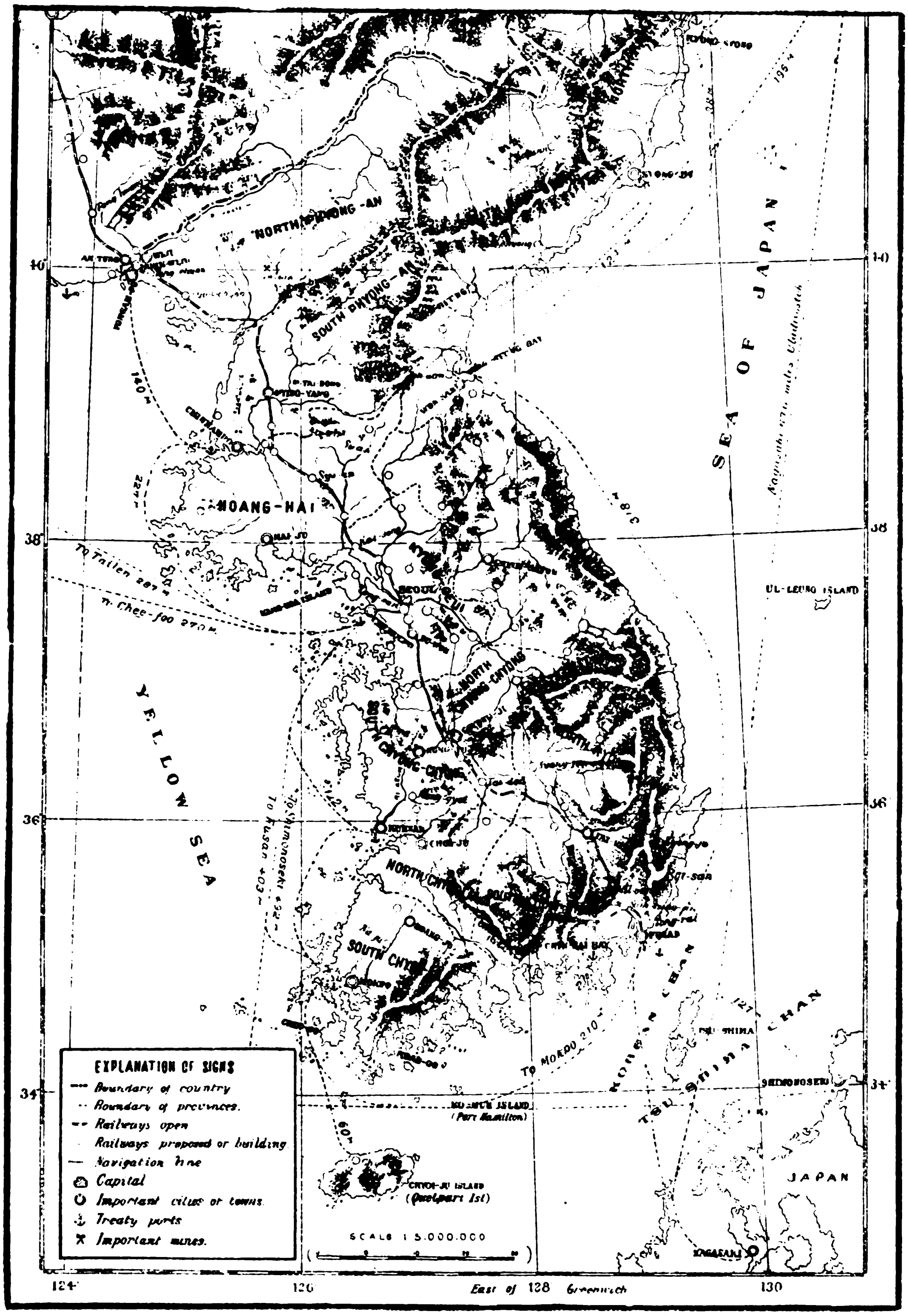
Anthracite Coal.—This is found most plentifully in the neighborhood of Pyengyang, along the Taidong River. The veins are about 32 miles in length and 7½ miles in width, and the amount of coal they contain is estimated at something like 200,000,000 tons. The working of this important coal mine is conducted by the government, which established as early as 1907 the Pyengyang coal mining station. Analysis shows that the coal contains volatile matter 7.20 per cent., coke 70-90 per cent. and ash 4-15 per cent. Of the output of the mine 90 per cent. is sent to the Tokuyama Coal Briquet Factory of the imperial navy and is used by the navy as a substitute for Cardiff coal. The annual production of the mine is as follows :

Year		Quantity of Output Tons	Sold: Quantity Tons	Sold: Value Yen
1913	... ...	118,393	94,598	815,830
1914	... ...	151,410	133,989	1,235,647
1915	... ...	188,078	167,012	1,538,681
1916	... ...	176,205	138,083	1,304,678
1917	... ...	154,145	120,061	1,297,256
1918	... ...	140,773	139,725	2,074,471

As the result of the government prospecting started in 1911, a number of large anthracite coal beds have been discovered, of which those at Kaichun, Tukchun and Soonchun in South Pyungan province, and at Samchuk in Kangwon province are considered most hopeful.

Iron.—The principal iron mines in operation are the Kaichun mine worked by the Mitsui Mining Company, the Chairyung and Whangju mines by the Mitsubishi Iron Foundry, the Chairyung and Un-yul mines by the government, the Yiwon mine by the Rigen Mining Company, and the Anak mine by the Asoh Mining Company. Deposits of iron are found in many other places, Sohsan, Tanchun, Samchuk, Kangnung and Moosan being the most notable ones. These are now being prospected. At present the government mines produce the most, being the oldest, followed by those at Anak, Kaichun and Yiwon, of which the government mines and Anak supply between them about 200,000 tons of iron annually to the Yawata Iron Foundry, while Kaichun and Yiwon supply between them about 40,000 tons to the Muroran Iron Foundry in Japan and 30,000 tons to an iron foundry in Manchuria. A large iron foundry is now being established at Kyumipo by the Mitsubishi firm, and a considerable increase in iron production is expected when this foundry, as well as the mines now in preparation, is in full working order. The great impetus given to the iron industry in Japan by the war and the bitter experience the country had in the shortage in the supply of the metal called the attention of many to the iron deposits in the peninsula, and it is expected that their development will go far toward the solution of this much-discussed iron problem.

Graphite.—The graphite found in Chosen is classified according to the form of its ores into scaly, fibrous, foliated and earthy. The first two varieties, which are considered the best, contain over 90 per cent. of carbon. These are mostly found in North Chosen, the principal mines being those at Koosung, Chosan, Changsung and Sakchu, while the other species, which are somewhat inferior in quality, are found in the south. The better kinds are mostly



MAP OF KOREA

exported to Japan, while the inferior ones are sent to Europe and America. During the war its export to the latter countries suffered on account of the shortage of bottoms, but the ban put on the export of the metal in Ceylon called forth a new demand for it in America, and this, coupled with the Japanese demand consequent upon the rise of the steel industry in that country, made 1917 a record year for its export at Y.1,520,000. But now that all these favorable circumstances have vanished, mining of it is on the decline, at least for the time being.

Copper.—Copper mining is still in its initial stage. Of the mines already known, Kapsan in South Hamkyung province, Changwon in South Kyungsang province and Hoochang in North Pyung-an province are worth mentioning. Kapsan mine was first owned by an American firm, the Collbran-Bostwick Development Company, but in 1916 was purchased by the Kuhara Mining Company. Work at this mine has already been started on quite an extensive scale, as a result of which 555,576-lbs. of crude copper was obtained in 1917.

Zinc.—Produced in combination with silver and lead, the existence of this metal was long ignored. The principal mines are one at Somindong in Yungbyun district, North Pyung-an province, and the other at Kumduk in Tanchun district, South Hamkyung province. Both these mines were known in early times as silver and lead mines, and the zinc they contained was thrown away. Somindong mine is now being operated by the Fujita Mining Company but the other is not worked yet.

Tungsten.—The mining of this metal was started in 1915, when a heavy demand for it came from abroad on account of the war. The metal is spread over many districts and the veins are generally very rich. Of the 40 mines already known Keumkang mine in Kangwon province, Chungyang mine in South Choongchung province and Nungdong mine in North Choongchung province are the principal ones.

Besides the above-mentioned minerals, molybdenum, mercury, tin, asbestos, mica, talc, jade, marble, kaolinite and siliceous sand are found in the peninsula in varying quantities.

Distribution of Mineral Deposits.—The distribution of deposits according to the minerals present in the different provinces is as follows:

Gold and Silver: Kyungki, North and South Choongchung, North and South Chulla, North and South Kyungsang, Whangshai, North and South Pyung-an and South Hamkyung provinces.

Iron: Whanghai, South Pyung-an, Kangwon and North and South Hamkyung provinces.

Anthracite Coal: South Pyung-an and Kangwon provinces.

Copper: South Kyungsang and North and South Hamkyung provinces.

Lead and Zinc: North and South Pyung-an and South Hamkyung provinces.

Graphite: North Pyung-an, North and South Choongchung, North Kyungsang, Kangwon and South Hamkyung provinces.

Pyrites: Whanghai, North Pyung-an and South Hamkyung provinces.

Brown Coal: South Pyung-an province and along the eastern coast of the peninsula.

Tungsten: Kangwon and North and South Choongchung Provinces.

Chromium: Found with tungsten.

Mica and Jade: South Hamkyung province.

Kaolinite: North Kyungsang province.

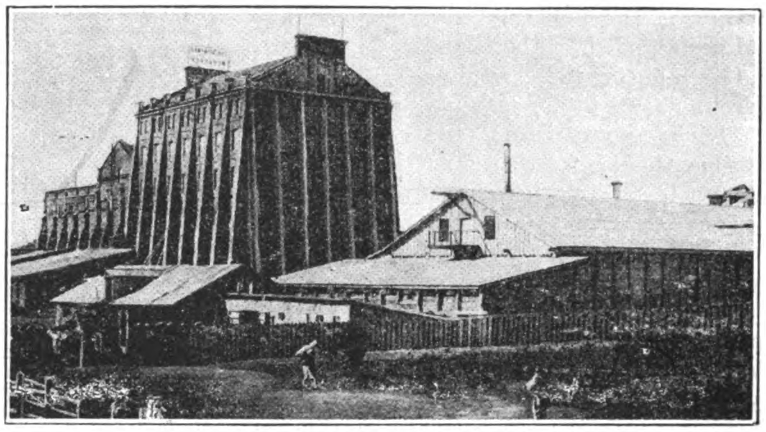
Siliceous Sand: South Chulla province.

HARBIN

HARBIN, rich in raw materials, is making remarkable progress in a manufacturing way, especially during the last few years when the general financial depression that prevailed for some time was superceded by trade activity. The port is more a prosperous manufacturer than a trader; and an ever-increasing number of mills, factories, plants, etc., is still evident in the official list of registration of industrial enterprises. There follows some information of important industrial enterprises lately established in Harbin :—

FLOUR MILLS.—Of a total number of 24 flour mills, five were founded by Japanese, 6 by Russians and the rest by Chinese. Since the outbreak of the Russian political troubles, the six Russian establishments have been brought under the control of Chinese. Meanwhile, two large mills have been opened: one is named Tseng Da, capitalized at $2,000,000, situated on the northern bank of the Sungari River and founded by Mr. Wang Ping-an; the other is named Han Hong, established by Mr. Yu Peng-fei, capitalized at $1,200,000 and located in Tung-sze-chia-tze. After a year's work spent in installing machinery and building factories, these two new mills have started to operate having a daily capacity of 360,000-lbs. of "The World" brand flour (Tseng Da) and 304,000-lbs. of the "Locomotive" brand (Han Hong). Furthermore, it is gratifying to note that there are two more flour mills to be established.

Manchurian Milling Co., Harbin



Flour Mill at Harbin

OIL MILLS.—In Harbin there are 47 oil mills, of which only three are Japanese while all the rest are under the control of Chinese. As a result of the success of the oil trade last year, five new mills have been established, making a total of 52 in number. They are the Yuen-shun-nee at Shang-fong, the Hun-da at Pai-zai, the Teh-kee at Koo-shan-dun, the Kwang-yuen-jen at Kiang-yen and the Chen-chon at Sing-tze-chang.

LEATHER FACTORIES.—The leather trade in Harbin has hitherto been almost entirely handled by foreigners who collect raw hides at a low cost and, when tanned, ship them back again to the district where they are sold at high prices. In an attempt to check this waste of money every year, a leather factory capitalized at $200,000 was organized in 1915 by Gen. Chu Chin-lan, ex-military governor of Heilungkiang, but unfortunately little success has been made owing to the insufficient capitalization. Now, another Chinese leather factory occupying premises of 1,000,000 sq. ft. at Chuen-I-wu is being organized by Mr. Chang Feng-ting, industrial magnate of Harbin. The new factory is capitalized at $3,000,000, half of which has been spent in purchasing machinery, and it is provided that capitalization will be increased whenever occasion requires. The machinery has been completely installed and will operate before long.

GLASS FACTORY.—Glass is in very high demand in Harbin since building work in the port has so much increased, and also owing to the local custom of having double glass set on each window frame in the autumn and winter. According to the customs returns, glass imported to Harbin in 1920 was valued at $10,000,000, seventy per cent. of which represented Japanese manufacture. Recently Mr. Chang Sou-hun, a Chinese chemist, has found that the sand on both banks of the Sungari river from Harbin up to Shiou-chen-tze and down to Hulanko, a distance of about 650 *li*, consists of deposits of raw materials fit for manufacturing glass, and experiments have shown that glass made of it is even superior to foreign glass in transparency, but more brittle, which fact, according to Mr. Chang, can be remedied. Following the discovery, a number of capitalists including Foo Han & Co., Chang Yuen & Co., Shen Tai & Co., Chen Tai & Co., Nee Foong & Co., and Tai Yih & Co., have approached Mr. Chang with the scheme to organize a factory with a capital of $10,000,000 at Chuen-I-wu occupying premises of 500,000 sq. ft. Mr. Chang has proceeded to America for the purchase of machinery, and advices have been received that the whole set of machinery will be conveyed to China in a month's time. The large buildings for the factories are in the course of construction and are expected to be completed before September.

POULTRY YARDS.—The trade in poultry and egg products in Harbin is very profitable nowadays. This is chiefly due to the insufficient supply against high consumption; for Harbin is so wide in area and so densely populated that it needs a very large supply of food stuffs every year. A British firm, established during the great war, sends away large shipments of hens, ducks and eggs every year. Believing in the future of this business some local leading merchants, Messrs. Li Mei-sun, Chang Tze-shi, Shia Tze-gee and Tseng Tze-ku are organizing a Poultry Co., Ltd., with a capital of $3,000,000 at Sung-hwa-tseng, on the northern bank of the Sungari river, having a yard of 500 *mow* in area. The company will, at the beginning, confine itself to raising hens and ducks and will raise cattle later on.

FLOUR-SACK MAKING CO.—As mentioned above, there are in Harbin 24 flour mills which require a great number of sacks. At present, one of the two kinds of sacks now in general use, made of cloth and capable of holding 40-lbs. of flour, is wholly supplied by Japanese who have a factory in Osaka with a branch at Harbin, and the other kind is made of cloth and hemp capable of holding 200-lbs., supplied by Indian factories. Some prominent local merchants, Messrs. Yang Han-jen, Yi Cheng-ou and others are organizing a flour-sack making company at Pei-zan with a capital of $1,000,000 (fully paid up). It will start to operate as soon as the machinery ordered from Japan arrives.

Importance of Yap and Guam as Weather Stations

By Jose Coronas, S.J., Chief Meteorological Division, Weather Bureau

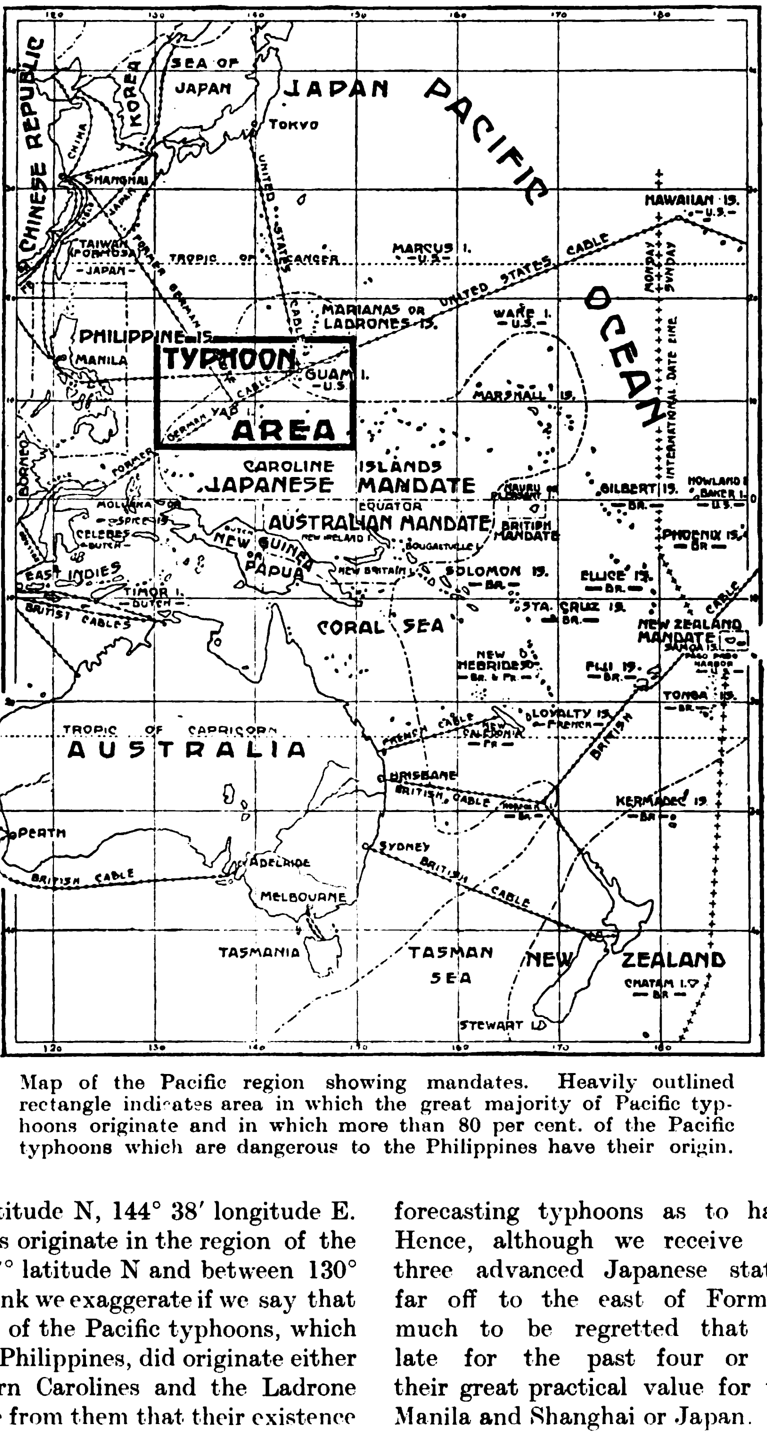
THE great importance attached to the meteorological stations at Yap and Guam for the purpose of forecasting typhoons is shown from the very fact that, only three months after Yap was in telegraphic communication with Manila, the Philippine government had succeeded in having these two stations established with all the necessary instruments carried there personally by the secretary of the weather bureau and the two observeıs appointed, to be paid by our insular government. Both stations were in working order by July 1st, 1905, while the cable from Yap had been landed on the Island of Guam during the preceding March.

Such quick action was possible thanks to the great interest in the matter shown by the government of the Philippine Islands as well as by the navy authorities of Cavite, and to the hearty cooperation of the governoıs of Yap and Guam. And this is by no means surprising, as there was question of something so vitally important not only for the Philippines but for the safety of navigation throughout the Far East.

A glance at the map of the Far East will easily convince anyone that, with stations at Guam and Yap, both connected now with Manila by cable, the efficiency of the Philippine weather bureau as an outpost to guard the whole of the Far East against surprises in the line of typhoons would be tremendously increased. Both stations were to round off the system of the Philippine meteorological service toward the east, that is to say, toward the region of the Pacific where the great majority of typhoons are formed.

Yap is situated about 700 miles east of Mindanao in 9° 29′ latitude N, 138° 08′ longitude E. and Guam about 1,200 miles east of southern Luzon in 13° 24′ latitude N, 144° 38′ longitude E. Now, the great majority of typhoons originate in the region of the Pacific comprised between 5° and 17° latitude N and between 130° and 150° longitude E. We do not think we exaggerate if we say that 80 per cent., or perhaps even more, of the Pacific typhoons, which have proved to be dangerous for the Philippines, did originate either in the neighborhood of the Western Carolines and the Ladrone Islands, or at least at such a distance from them that their existence and position could be easily traced with the observations of Yap and Guam several days before they influenced the barometer and the weather of the Philippines.

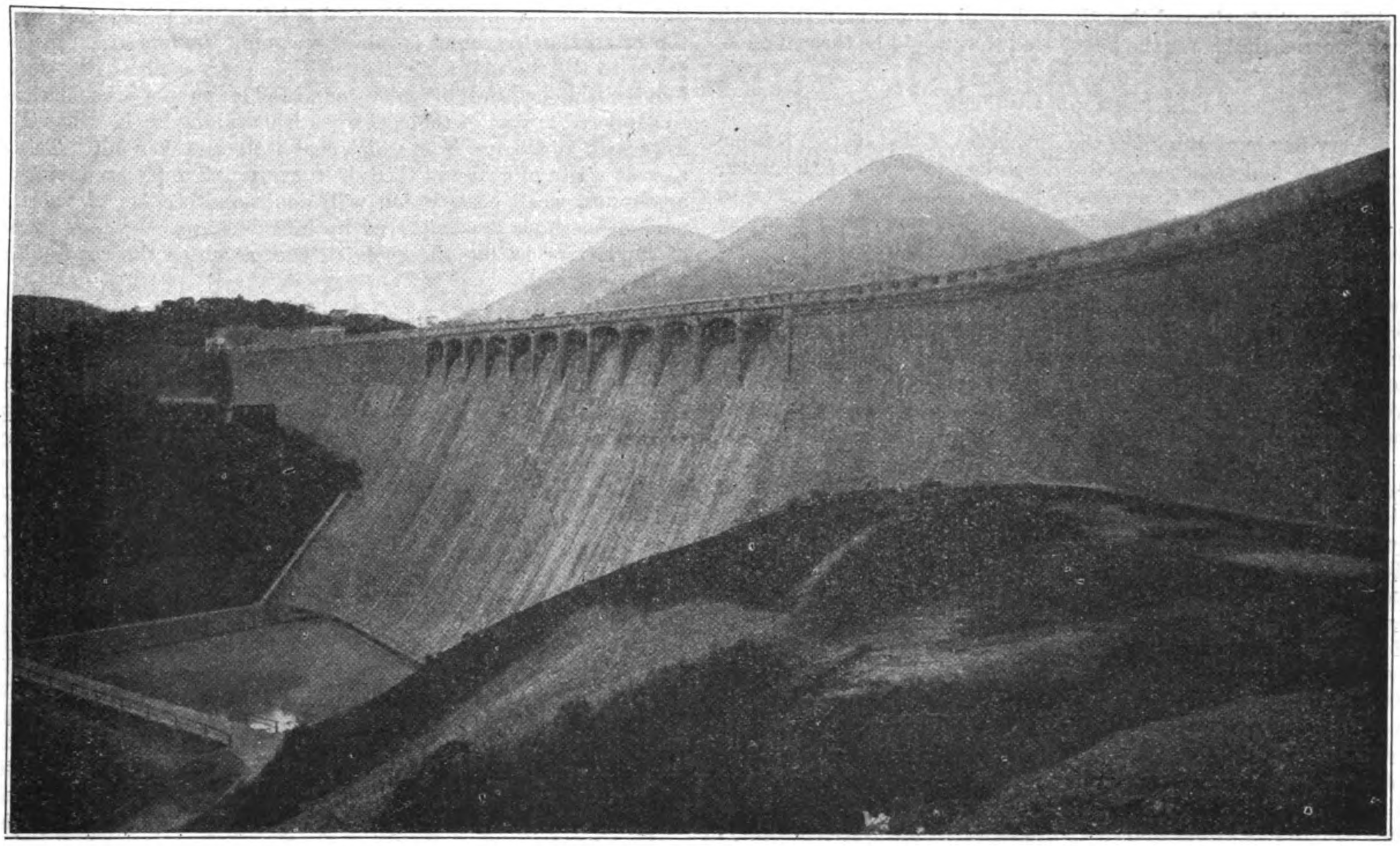
With observations received daily from Yap and Guam not only the existence and position of a typhoon, but also its direction, can be easily ascertained. With the exception of typhoons curving northeastward before reaching our archipelago, experience has shown that typhoons that form or pass between Guam and Yap are very dangerous as a rule for the central and northern part of Luzon, while typhoons that come from the south of Yap or from the neighborhood of Yap, are generally dangerous for Mindanao, the Visayas or the southern part of Luzon.



Map of the Pacific region showing mandates. Heavily outlined rectangle indicates area in which the great majority of Pacific typhoons originate and in which more than 80 per cent. of the Pacific typhoons which are dangerous to the Philippines have their origin.

Captains of steamers have often told me that our typhoon warnings to Hongkong based on the observations of Yap are of the greatest importance and value for steamers bound from Hongkong to Manila. And the reason is quite evident. Without observations from Yap an ordinary typhoon from the Pacific could haıdly be announced more than one day in advance before it reaches the Philippines; and as it would take one day more in crossing the archipelago, it would follow that steamers which spend ordinarily about two and a half days in crossing the China Sea, would meet the typhoon near the western coast of Luzon without having been warned of its existence before leaving Hongkong. As the typhoons that form over the Pacific west of 130° longitude are rather rare, it will seldom happen at present that steamers leaving Hongkong for Manila will meet a Pacific typhoon without previous notice.

The promptitude in receiving weather telegrams is almost as important for forecasting typhoons as to have advanced repoıting stations. Hence, although we receive telegraphic weather reports of three advanced Japanese stations of the Loochoos situated far off to the east of Formosa and the China coast, it is much to be regretted that they have been received so late for the past four or five years as to lose much of their great practical value for the safety of navigation between Manila and Shanghai or Japan.



Daniel Jaffe's Monument: the Great Tytam Dam Storing Hongkong's Water Supply

An Engineer's Monument

IT is, perhaps, not too much to say that Daniel Jaffe was the victim of his own high ideals concerning duty. He was, above all else, a conscientious worker. He has left enduring monuments of his ability in Hongkong, but very few people have had the technical training which is essential for a full appreciation of the value of Jaffe's work. His name is, rightly enough, connected in the minds of most of the older residents of Hongkong with the great dam that holds up the many millions of gallons of water in the big Tytam reservoir. What is not generally known is that Jaffe designed the dam and closely superintended every detail of its construction.

To most of us there comes a great day, a day when it seems worth while to have toiled at details of some work in hand. Jaffe's great day must have been on that historic occasion when H.E. Sir Henry May paid an official visit to Tytam and declared the reservoir open. The words of praise from the governor were no doubt appreciated by the skilful engineer, but the thought that he had completed a piece of work that would endure for centuries must have been Jaffe's great reward.

There is the saying that "No man is a hero to his own valet." Life in the little Colony is very much like life in a country town in England in as much as we all know too much about each other for heroes to exist in our midst. There were, however, those who deeply respected Jaffe, for they knew that he spent himself freely in the public service. It is perhaps not too much to say that, if we consider only technical ability, Jaffe has had no rival in the public works department of Hongkong since there has been a public works department. There have been, no doubt, men as industrious, men more suitable to act as the head of a great municipal service. There has, however, been no resident of the Colony, as yet, who has carried out, for the benefit of the public, such a magnificent piece of engineering design and construction, as is the dam at Tytam.

It Will Endure

Hundreds of "joy-riders" pass along the tops of the dam each month as they trip round the island by motor. They are probably too delighted with the beautiful scenery to give much thought to the dam itself. They may glance at the stone which says that Jaffe was the man who built it. It is only three or four years since the work was completed, but so quickly do Britons come and go in the Colony that not many people who take the trouble to look at the stone could call to mind the features of the man who did the work.

As you pass through the Suez Canal on your way "home" you see a statue to De Lesseps. It reminds one, not only of the triumphs of the man who built the Suez Canal, but of the tragedy of the failure of Panama. The stone at Tytam reminds one of Jaffe's triumph, but also of the tragedy—the price that fate made him pay for it. The seeds of the malignant disease which finally caused his death were almost certainly sown during the excavations for the foundations at Tytam. As the huge dam appeared to grow, slowly, in height, so did the health of its builder grow worse and worse. As the dam increased in strength, the powers of resistance to sickness of its creator grew weaker and weaker. But his zeal never slackened. The building of the dam was what the painting of a picture is to a great artist, a something in his thoughts for years. He knew almost every stone of it. He had tested everything connected with it that could be tested. If you look out over the dam to the sea you will notice masses of concrete which show where the dam was to have been placed originally. The

preliminary tests showed that the geological formation of the earth there was unsuitable for the heavy load that would be thrown on it.

A Man of Courage

Very few men who knew the difficulties of that Tytam scheme would have had the courage to undertake the whole of the work. The usual practice is to employ a famous consulting engineer in London and then to place someone of Jaffe's experience in charge as resident engineer. In this case the very heavy fees of the consultant were saved for Hongkong, but the anxiety and the mental effort connected with the preparation of the plans and the design work were too much even for Jaffe's iron frame. And in the end this truly great public servant died at the comparatively early age of 46 after a long and painful illness. It is to be sincerely hoped that the Colony will see to it that his dependents are provided for properly.

Many men have amassed fortunes in Hongkong. We hear stories of Jones and Brown who retired a few months ago with £100,000. They are lucky—they made it by "inside knowledge" or by chance. Jaffe was a man of an altogether different temperament. He had selected a profession to which he devoted himself body and mind. He did not reap a golden harvest, but he did a very great public service. He did work that will endure as long as Hongkong endures. He, in actual fact, gave his life for Hongkong just as much as a soldier in Trones Wood gave his life for his country. Britons know nothing of how, at last, they laid the wasted body at rest. For years a restless creative mind had overtaxed the resources of a human frame that at first seemed as if made of iron. The creative mind did its valuable work. Britons, of Hongkong, who had just an acquaintance with the reserved man and very earnest public servant who has so recently passed away, will hold in deep respect the memory of one who did what England expects of every Briton.

The Coal Field at Tatungfu

Output

THERE are dozens of native coal pits scattered all over this great coal field. The present output of coal, amounting to over 100,000 tons per year, comes exclusively from them, as the few modern collieries that have been started have not as yet reached the producing stage. Coal has been mined in this coal field for centuries and producing pits have, many of them, been in operation for many decades. Their long life is due to the small output, which is seldom more than 30 or 49 tons per day in the case of the best pits. The output from the average pit is about 10 tons per day.

The Pits and Their Working

All the pits are on or near the outcrop of coal and generally the producing pits are in seams of gentle dip and so free from water as to be able to dispense with pumping altogether. They are all inclined at an angle of about thirty degrees and from 100 to 150 feet deep vertical from the surface. The floors of the pits are in steps, each of which is about 8 inches high, upon which coal is carried from underground to the surface on the back of the coal carrier. On striking the seam, the miners work the coal in a modified form of the Long Wall Advancing System. Through long experience, they show some skill in their method of working. The coal is taken out in very large blocks—each from 20 to 40 feet long and 15 to 30 feet wide. The block is cut on two sides from floor to roof about two feet wide and 15 to 30 feet deep and then undercut for the same depth. In the latter operation, as the miners advance they support the solid coal above them with the small coal obtained in cutting and undercutting the block. When the supporting small coal is removed, the whole block of coal comes down by its own weight. No coal is left in the pillars and every ton of coal underground is mined, but only the largest lumps are taken to the surface, while the coal less than one-half of a cubic foot is abandoned and left underground and is used as goaf or packing to support the roof of the coal seam from falling in the areas that have been mined and from which coal has been taken out. This is a great waste of coal and there is in every native pit an enormous amount of small coal, which will, doubtless, become of value if modern methods are employed by introducing some other means of support or letting the roof fall except where the roads have to be protected.

Costs

As a rule, the mine operator leases the land from the landlord, who is under the small mines act also the owner of the coal contained in his land, on a rental, established by custom, of three per cent. of the total output. The former employs men on the following terms:—The coalcutter gets about 5 cents for every square foot of area irrespective of height. The coal carrier gets 4 cents for every 150-lb. of coal he carries from the working face to the surface, a distance ranging from 1,000 to 1,500 feet.

Sale Prices

The coal is sold at pit's mouth from one dollar to one dollar and sixty cents per ton, depending on the quality and distance from the railway station. The former figure is for the Jurassic coal from the middle of the basin, distant from station from 10 to 20 miles, where the coal is much thicker but inferior (comparatively) in quality; while the latter figure is for the coal of the carboniferous age near the rim of the coal field, distant from station 5 to 8 miles, where the coal is thinner but superior in quality. The coal is sold at the railway station from $3 to $3.50 per ton.

The "Docks Gazette"

The shipping world is fortunate in having such a periodical as the "Docks Gazette" a quarterly magazine, which, in the hands of its new proprietors Messrs. Walter Judd, Ltd., has become a monthly periodical. In it are always articles of interest to dock authorities, matters relating to dock dues, congestions and delays, shipping awaiting berthages, storage, changes in harbor and docks administration, etc. A number of improvements will be noticed in recent issues, and doubtless appreciated by present subscribers and others connected with the shipping world who will be attracted by the contents and useful purpose of the journal. It is issued the first week in every month at 97 Gresham Street, E.C.2, and the annual subscription is 7/6 for the United Kingdom or abroad.

Japan's Coal Resources

The figures given in the report on coal investigation, by the bureau of mines, Japanese department of agriculture and commerce, show the unmined resources to be as follow: Developed, 822,000,000 metric tons; surveyed, 2,940,000,000 tons; estimated, 5,030,000,000 tons; total, 8,792,000,000 tons. The first two categories together total 3,762,000,000 metric tons, of which it is estimated that a net amount of 1,738,000,000 tons is recoverable. Sand flushing has been used with success in some of the Japanese mines, and if such methods are found to be applicable in any great degree to a large number of the mines, a much larger amount of coal may be obtained. The Japanese engineers estimate that at least one-fourth, or a net amount of 1,257,000,000 metric tons, is recoverable by present-day methods. This makes a total of net available coal resources in Japan proper of 2,995,000,000 metric tons. The figure does not include the resources of North Formosa, estimated at 461,200,000 tons net, or the Fushun mines of South Manchuria, owned and operated by the Japanese South Manchurian Railway, which are estimated at 1,000,000,000 tons.

Japan's Finances during the Great War

By J. Inouye (Governor of the Bank of Japan)

THE great war has brought about signal changes in the financial and economic position of Japan. While the belligerent powers in Europe have been reduced to straitened circumstances, Japan, like the United States, has been placed in a position of singular advantage in consequence of the war. I shall here briefly review these war changes as they affected Japan, and hazard a forecast as to her future financial and economic status.

From 1915, the year after the outbreak of the war, onwards Japan's export trade attained a marked progress. This originated in the sale of munitions to allied countries, but general commodities soon followed in the wake of war requisites. In the meantime our trade with China, India and the South Seas increased as the export trade of other belligerents dwindled. Our exports during the four years 1915-1918 amounted to Y. 5,400,000,000 and imports to Y. 4,000,000,000, the balance in our favor attaining the high figure of Y. 1,400,000,000. Also, Japan's mercantile marine increased from 1,500,000 tons in 1914 to 3,000,000 tons in 1920, the sudden expansion of her foreign trade and the withdrawal of other belligerents' shipping from the Chinese and Indian waters and the Pacific soon after the outbreak of the war having given the impetus to this huge growth of her shipping capacity. Japanese ships have meanwhile gradually extended their sphere of activity to world-wide limits. This increase in Japan's tonnage, accompanied by enhanced freight rates, further swelled her credit account with foreign countries. The activities of the Japanese marine underwriters were another factor that intensified the same tendency, for their insurance contracts increased from the comparatively small amount of Y. 1,700,000,000 in 1914 to over Y. 15,000,000,000 in 1920.

Mr. Junnosuke Inouye, Governor of the Bank of Japan

Japan's Credit Abroad

The excess of her exports over imports and her receipts, as I have mentioned above, in the shape of freight and insurance premiums, have brought about a signal change in Japan's credit standing with foreign countries. Her foreign loans and investments, which barely reached Y. 400,000,000 in 1914, increased to roughly Y. 2,000,000,000 in January, 1921, exclusive of her gold credits accumulated abroad, amounting to Y. 1,000,000,000, which brings the total up to Y. 3,000,000. Her foreign indebtedness, on the other hand, decreased from Y. 1,900,000,000 in 1914 to Y. 1,500,000,000 in January, 1921. Thus Japan's net gain financially for the last seven years has footed up to three thousand million yen.

A specially significant change is to be observed in the position of our specie reserve against notes. After Japan's adoption of the gold standard in 1897 her liabilities to foreign countries steadily increased—the war with Russia and the continued unfavorable trade balance being the principal causes. In consequence she experienced considerable difficulties in maintaining her gold reserve, which in 1914 barely amounted to Y. 200,000,000. Then there came the rapid growth of our export trade, and the consequent influx of gold from various parts of the world, which continued until at the end of 1920 the total amount of our gold holding had risen to no less than Y. 1,100,000,000. This enormous increase in our gold reserve has resulted in an expansion of our notes in circulation from Y. 300,000,000 before the war to Y. 1,500,000,000 at the end of 1920. Bank deposits in general also increased from Y. 2,200,000,000 at the end of 1914 to Y. 8,100,000,000 in August, 1920.

This enormous increase in our resources and expansion of monetary circulation and deposit currency could not but be followed by an increased consumption of commodities and by enhanced prices. The augmented demand both at home and abroad for all varieties of our products gave a signal impetus to our industrial activities, resulting naturally in the promotion of innumerable new enterprises and the extension of existing factories. It would be tedious to deal with each and all of the leading industries of Japan. I shall here mention a few representative goods for export for purposes of illustration:

	Output in 1914.	Output in 1919.
Cotton yarn	1,666,000 bales	1,911,000 bales
*Raw silk	23,474,000 catties	35,675,000 catties (1918)
Paper	327,614,000 lb.	519,141,000 lb.

It may be assumed with absolute certainty that almost all other varieties of our manufactured goods showed similar increases during the period under review. The principal causes of this industrial expansion are increased consumption at home, flourish-

*Total receipts at Yokohama: 305,000 bales in 1914 and 517,000 bales in 1919.

ing export trade, and larger production of substitutes for high-priced imports.

To sum up, Japan has vastly increased her resources during and owing to the world war, and has greatly strengthened her financial and economic potentiality. Not merely has she succeeded in raising herself from the position of a country which had to work, as a rule, with an unfavorable trade balance and often found it very difficult even to pay the interest on its foreign loans; she now finds herself a creditor country. The tide of fortune has certainly been in her favor. Of course Japan has now to face increased prices, heavier taxation, and a general rise in cost of living, but these cannot be regarded as unbearable burdens to her, if her enriched resources are taken into consideration. The only pertinent question that may be asked by Japanese and foreigners as well is how Japan can manage to maintain her present resources or how she can utilize them.

The Crisis of Last Year

Failure to avert over-speculation and misuse of credit inuced by the expansion of currency and bank deposits resulted in the reactionary episode of April 1920, which proved the more serious inasmuch as the preceding boom had been quite unprecedented. The pain was all the keener felt because of the abounding good fortune in the past. But these ups and downs in business are merely temporary incidents, like the ebb and flow of the tide water. Even the blow that has been dealt by the reaction can in no way deprive Japan of what she had piled up during the war. The most judicious way to maintain permanently and utilize the resources thus built up is, firstly, foreign investments. The hoard of bank deposits is more than enough for financing trade and business enterprises at home or to take care of our foreign commerce, and the surplus can well be invested abroad; nay, the financial situation here now is such that foreign investments will prove the convenient way of disposing of the funds seeking outlet. The second is to keep up and further encourage the foreign trade. The factories which were newly erected or enlarged during the war can only with difficulty be maintained in the face of diminished home consumption to-day. If they are to be kept going, larger markets for their products must be sought abroad.

Future Prospects

Japan's trade balance, which was in her favor till 1918, turned against her after the armistice, and the markets for her exports are now gradually falling away. Apart from the wane of the purchasing power of her foreign customers, this may be ascribed to the rise in the cost of production at home, which acted as a hindrance to our export trade. Reduced cost is, therefore, the primary pre-condition of any revival in our export trade. Already the falling-off in home consumption and in exports is compelling the cutting of hours and reduced production in many lines of industry. This tendency will be more intensified in the future and force lower wages or discharge of laborers, which in turn will conduce to further curtailment in consumption and lower prices, and thus a reduced cost of production will ultimately result.

In conclusion, our big banking resources will suffice to maintain and assist the productive powers of the country while Japanese capital invested abroad during the war will to a certain extent pave the way for our future trading activities. Our markets in India, the South Seas, South Africa, and South America are of a more or less permanent character, and our merchants have gained considerable knowledge and experience while extending their operations to those regions. Our mercantile marine that expanded so enormously during the war has succeeded in establishing connections that will bring into full play the geographical advantages enjoyed by Japan. When all these things are taken into consideration, the conclusion becomes inevitable that Japan can continue to carry on her foreign trade in the belief that she will ultimately constitute herself the financial and commercial centre of the Orient.

The Salt Industry of Japan

FROM the commercial councellor to H.M. embassy at Tokyo has been received the following report, which is quoted by the *Board of Trade Journal*:—The salt monopoly system was originally introduced into Japan for revenue purposes towards the close of the Russo-Japanese war. It worked fairly successfully at first, but on account of the slow progress of the industry, increasing costs of production and consequent high prices paid by industrial and other consumers, considerable discontent became evident, and there arose a general movement in favor of its discontinuance and reversion to private enterprise, not only in Japan proper, but in Korea, Formosa and the Kwantung Leased Territory. There is, however, a minority opinion in favor of the retention of the monopoly on the ground that emergency requirements will be the better met in time of war, and efficiency improved by unity of control. It is impossible to predict what the commission, at present sitting, will decide, but it is evident that no decision is going to be made without the most careful deliberation, in view of the growing danger of a shortage of salt for industrial purposes.

According to a recent report in the *Asahi*, one of the leading Tokyo newspapers, the commission found that the total production of salt in Japan and her dependencies in 1919 was about 1,053,600 tons, while the domestic consumption did not amount to more than 880,000 tons. It is difficult to accept these figures so far as consumption is concerned, for there was a heavy excess import from foreign countries: 413,417 tons were imported, while exports amounted to 12,767 tons. During the last five years, 1915-1919, exports remained practically stationary, with a tendency to decrease, and last year the decline was very marked, but imports have increased by leaps and bounds. In 1915 they were under 30 tons, and 1919 over 400,000 tons. These figures indicate a strong and growing demand which, according to the estimates of the commission, cannot be met in Japan even if potential extensions of salt fields be realized.

A Japanese chemical expert, Dr. Ikeda, has been for some time attempting production of salt by direct evaporation of sea water, but the results of his experiment are not yet known.

The following tables, showing Japanese production of salt, imports from foreign countries and exports from Japan, serve as a guide in estimating Japan's position in regard to salt:—

PRODUCTION OF SALT, 1916-1919.

Year.	No. of Farmers.	No. of Farms.	Area of Farms. *Cho.*	Quantity Produced. *Kin.*
1916	10,366	6,104	5,881	1,034,202,782
1917	10,501	6,079	5,881	1,003,475,379
1918	10,117	5,971	5,822	675,510,688
1919	9,938	5,860	5,781	981,215,355

TOTAL QUANTITIES OF SALT IMPORTED INTO JAPAN, 1916-1919.

Year.	Amount Imported (*Kin*).	Value (*Yen*).
1916	188,749,000	1,270,459
1917	387,483,000	4,484,132
1918	595,822,000	9,625,243
1919	876,737,000	17,119,375

EXPORT OF SALT FROM JAPAN, 1916-1918.

	Export to Foreign Countries. To Asiatic Russia. *Kin.*	Other countries. *Kin.*	Total. *Kin.*	Export to places in Japanese Empire. *Kin.*
1916	86,278,468	255,576	86,534,044	25,484,337
1917	113,400,598	202,280	113,602,878	25,988,581
1918	104,997,512	8,024	105,005,536	27,247,919

[*Note.*—*Yen*=2s. 0½d. (par). *Kin*=1.323-lb. *Cho*=2.45 acres.]

The Far Eastern Review

A Monthly Review of Far Eastern Trade, Finance and Engineering, Dedicated to the Industrial Development and advancement of Trade in Far Eastern Countries

ENGINEERING FINANCE COMMERCE

5 JINKEE ROAD, SHANGHAI CHINA

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A Victory for Peace

WITH the call for a Pacific conference, THE FAR EASTERN REVIEW terminates a campaign of education of fundamental Far Eastern and Pacific problems. In the interests of peace and good-will the story of Japan had to be frankly told to the American people and as the oldest American publication in Asia with a full knowledge of inside facts, it devolved upon us to shoulder the unpopular task of telling the truth about events that have been clouded and concealed behind a propaganda having for its purpose the precipitation of hostilities between Japan and the United States.

Jingoes, war-makers, agents of armageddon, propagandists and general disturbers of the peace of nations, have been silenced by the facts. The only answer vouchsafed to the articles in the FAR EASTERN REVIEW has been an underhand, unethical counter campaign calculated to destroy the usefulness of this publication as the exponent of American ideas. A year ago the war-makers held the lime light and it became unpatriotic in certain quarters to express thoughts or ideas that conflicted with the popular craze for immediate war with Japan. The principle had been accepted that while war with Japan was not inevitable it was a possibility, and the patriotic thing to do was to discredit her beforehand, so that, in the event of hostilities, she would stand alone without a friend in the world.

Conditions have changed. The agents of armageddon are now scrambling aboard the band-wagon and indignantly resent any insinuation that at any time they were in favor of war. They are now the original friends of peace. It is better so.

It is only necessary to gather the consensus of American opinion as expressed through editorials in the prominent newspapers, in other to convince ourselves that the war-makers never had a chance to make headway against the every-day horse sense of the American people. THE FAR EASTERN REVIEW emphasized over a year ago that there "ain't going to be any war," and there ain't.

The Anglo-Japanese alliance will be renewed with modifications, whose purpose will be to make certain that the treaty will in no way disturb British relations with the United States. The calamity howlers who swarmed out from Peking to scare the world with the prophecies of war if the treaty was renewed, have been silenced through events at the British imperial conference which decided the fate of the alliance. This has been a great set-back for the jingoes.

The Russian Soviet and the Germans have been looking gleefully toward a war between Japan and America, but as the *Philadelphia Record* points out:

"It might serve the purposes of the Bolshevists and the Germans to have either the United States or Japan put out of business; but if wishes were horses beggars might ride, and Prussia and Moscow could divide the world between them, or fight for the whole of it. But there is going to be no war, and the United States and Japan will remain powerful nations, which Junkers and Bolshevists will do well to take note of."

Especially disconcerting to the war-makers were the reports of Mr. Charles Edward Russell, who was sent to Japan by a New York newspaper to study conditions and ascertain what foundation there may be for the belief that the island empire entertains dark designs upon the United States. Mr. Russell is unable to discover the terrible monster that plans to devour the earth and against whom we must ever be armed to the teeth.

What he found was a Japan whose chief need is not more land but more raw materials to help change it from an agricultural to a manufacturing country; a Japan that, like other countries, has its jingo and militarist factions who get into power, make blunders and are suppressed by the larger sentiment of the nation; a Japan in which intelligent Japanese already admit the mistake of high-handed methods in Corea; a Japan that means to return Shantung to China; a Japan that has no dark designs upon the Philippines.

That will be very disappointing to our bogey-makers and sword-shakers, adds the Muskegan chronicle; what they insist upon is a Japan that causes our flesh to creep and our blood to curdle. They can be satisfied only with a Japan that keeps us awake and shivering in our beds and causes us to get up and ask to be taxed a billion dollars or more for battleships, and other scores of millions or more for war. To them the reports of the Russell investigation will prove very disappointing.

The Minneapolis Journal, with a keen insight into Asiatic affairs, bears out the attitude of THE FAR EASTERN REVIEW in the following terse editorial:—

"Before the great war there were four factors in Asiatic politics tending to create friction. Foremost of these was the ambition of Russia to bring China, India and Persia under her domination. This forced upon Great Britain diplomatic activity in the Far East to safeguard India, the keystone of her empire. At the same time, it stimulated the military spirit in Japan to protect herself. Berlin, ever jealous of London, was only too eager to help play the Russian game in Shantung.

"Until 1914 the United States had never taken a decided stand in Asiatic affairs, except to commit the powers to the 'open door' agreement. But in the Wilson administration the United States began a blind and inconsistent policy of meddling, which only added to the talk of war with Japan. The seed sown then is blossoming now.

"Though America's only Asiatic policy concerned the preservation of China, President Wilson threw this tradition aside when in Paris he acquiesced in Japan's claim to Shantung. On the other hand, when the Japanese army went into Kamchatka, Washington made a protest as if it really had an interest in things Siberian.

"The Harding administration has made no declaration as to our Oriental policy, except to demand the internationalization of Yap. This delay may indicate realization of the dangers and a desire to study and arrive at a real solution. With Germany banning emigration to America and preparing to help Russia in colonizing Siberia, the four elements to Asiatic politics may come to the fore again as centres of friction.

"Unless America understands the age-old movement, and realizes Japan's necessity to be prepared against the Berlin-Moscow threat, the American people may find themselves pushing a German hope. That hope is that America will war with Japan and weaken her so that Germany working with Russia could rebuild its empire in Asia."

This reflects the almost unanimous opinion of the more influential American newspapers. When we add to this the opinions of leading bankers and manufacturers, represented by such men as Mr. Thomas W. Lamont, Judge Elbert Gary, and others, who have consistently labored to counteract the pernicious activities of the war-makers, the chances of any break in the friendly relations between Japan and America may now be considered as a thing of the past. Most of the irritation arose out of the wobbling, pin-pricking policy of the past administration, and the half promises held out to the Chinese that America would come to their armed assistance in the event that Japan crowded her too far. The reason why the campaign has been permitted to drag along is due largely to the fact that those who were most prominent under the last administration in creating these issues, are still in positions which enable them to keep alive the controversy, and mislead their Chinese friends into believing that they still influence the American government.

The attitude of sensible American financiers and business men is summed up in an article in *The Journal of the American Bankers'*

Association from the pen of Mr. A. Barton Hepburn, chairman of the advisory board of the Chase National Bank. Mr. Hepburn says:

"Japan and the United States were both made creditor nations by the war. There is no question about the credit of either one of them. They are both on the gold standard, and to these two nations more than to any other and all others the world is looking for the preservation of the gold standard and the protection of the credit fabric of the world. We have no time nor occasion to 'scrap' with each other, but should work in unison for the welfare of the world.

"The Japanese do not want to fight us, they wish to live upon friendly, even cordial, terms with us. But they do want to live, and they must expand. They are not allowed to migrate to our country or Canada, and we froth at the mouth when we hear that they are getting a foothold in Mexico. What else is there for them to do but to expand on the Asiatic continent? We certainly would were we similarly situated, England would, any country would.

"And why cannot we let them follow this natural course without this continuous nagging? It only exasperates them, and we have no intention of doing anything about it. This country would never go to war over the Shantung question; it would never go to war to preserve the open door in China. England, with Hong-Kong and outlying territory, is as much an offender as Japan can be; France is similarly situated. Japan has succeeded to the rights of Russia and Germany, acquired in both instances as the fruits of victory in war. Her foothold at Dalny and Port Arthur and the possession and ownership of the South Manchurian Railroad came to her as the result of the Treaty of Portsmouth, and as part compensation from Russia. China is no worse off, but far better off, to have this railroad and rights in the possession of the Japanese, for instead of a military line for strategic purposes as it was under the administration of Russia, it is now a great commercial railroad, serving the interests of the people and affording them an immediate market for everything they can raise.

"No one rejoiced more than the United States when Japan drove the Germans out of Kiaochow and closed that port as a base for German submarines and German commerce destroyers. By a treaty with England and France, she was the acknowledged successor to the German rights in Shantung. Why not let her enjoy the fruits of her victories without this constant nagging? To turn Shantung over to the Chinese government now would be surrendering the territory to banditry and outlawry, since the central government of China is without funds and without resources and without power that any one respects. Japan is quite ready to surrender the sovereignty of the country to China; she naturally seeks commercial advantages and the protection of her commercial interests. She is very human and is actuated by the same impulses that would actuate our nation."

THE FAR EASTERN REVIEW has complied with its duty. It will continue to be a friend of Japan and of China, and at the same time preserve that spirit of independence and one hundred per cent. Americanism which has characterized its policy of giving a square deal to all national interests in this great field of conflicting international policies and trade rivalries.

* * *

Manchuria

The Land of Opportunity

THE unsavorary criticisms directed against the management of the South Manchuria Railway Company in both houses of the Japanese parliament has resulted in the appointment of a new president and the adoption of a definite policy. The selection of Mr. S. Hayakawa to head the new board, and the appointment of Mr. Y. Matsuoka to the directorate, to those conversant with Japanese politics is an indication of the government's intention to develop Manchuria and near-by regions along lines that will not only safeguard Japan's own economic security, but open the door to complete harmony with China and other nations through business co-operation. Mr. S. Hayakawa is a banker, one of Japan's leading financiers, intimately associated with the big transaction of the nation since the days of the Sino-Japanese war. He was one of the founder's committee of the S. M. R. Company and had much to do with the formulation of the policy that has enabled this line to reach a foremost place as one of the great civilizing and developing instruments of the world. For, cavil as we may about Japan's foreign policies, when all is said and done, the South Manchuria Railway has equalled, if not eclipsed, the record of some of the more world-famous railways that have reclaimed the wilderness to civilization. It created the great soya bean trade, developed the coal and iron resources of Manchuria and transformed Dairen into one of the most up-to-date and busiest ports of the world. It is of supreme importance as a main artery of communication with Europe, an international highway that for many years must serve as one of the great links between the East and the West. It is no wonder, therefore, that one of the founder's committee should take pride in its achievement and consent to assume control of its affairs at a time when it was the target of unfavorable criticism.

Those who still think of Manchuria as it was twelve or more years ago, when American and British merchants were loud in their denunciations of Japanese policy in those regions, and who still fondly cling to the delusion that it is a closed territory in which no one but a Japanese can do business, will resent any statement which deprives them of this moth-eaten indictment of Japan. It is now "olo custom" and traditions die hard in the Far East, where truth has been mutilated and massacred by years of propaganda.

Japan's policy and interest in Manchuria were again clearly and emphatically set forth by the new president of the South Manchuria Railway on his arrival at Dairen. He said:

"Manchuria and Mongolia have a very important bearing upon securing the economic existence of the Japanese people, for, their development, in addition to meaning a general economic development of the Japanese people, it is also directly concerned with the grave issues concerning the problems of population, foodstuffs, etc.

"The development of these regions has such a serious significance not only with Japan, but also with China. For, it is in these same districts that the so-called Sino-Japanese co-existence and co-prospering can be realized, and it is patent that this realization will go a long way towards consolidating the peace of the Far East and promoting the welfare of mankind in general.

"This company, as you all know, has been brought into existence by great sacrifices on the part of the Japanese nation. Its mission lies in the development of Manchuria and Mongolia, which has a serious significance for both Japan and China — indeed for the whole of the Far East. The development, I am referring to, is, and must be, fundamentally economic.

"It is my intention to assume the management of the company with this mission for the warp, and the Sino-Japanese co-existence and co-prospering for the woof, of my activity, and I hope that you will take due note of this point.

"Again, this company is a sharestock or commercial concern and is expected to distribute a reasonable dividend to its shareholders. It has this obligation besides the national mission above mentioned to fulfill.

"Although this company is a Japanese corporation, it is, I need hardly point out, operating railways and carrying other enterprises in Chinese territory, part of the important world's highway. These two points must well be borne in mind. Then, this company may be called the greatest international property or enterprise held by Japan abroad. The company's activities are, it must be also borne in mind, under the constant survey of the powers.

"The world's situation has changed and is changing in many respects from what it was at the time this company was first established. We cannot be too careful in every move, and, following the world's progress, we should adapt ourselves thereto; as to the Sino-Japanese relations, we ought to do our utmost in cultivating a good mutual understanding, and should aim to make ourselves an effective link of the Sino-Japanese economic league.

"Towards all nationalities, we must observe loyally the principle of equal opportunity and be guided by the spirit of harmony and co-operation, and should demonstrate to the world the open and fair attitude of the Japanese people. Free competition is what we do expect and welcome heartily. We shall meet any and every competitor like a sportsman and should hope to win by merit only."

The above is a clear cut statement of Japan's ideas as to equal opportunity and the open door in regions where she has paramount interests. It fully answers the accusations that the "door is closed in Manchuria," that "where the Japanese go in, the white man goes out." Americans are prone to overlook that the reverse of this last catch phrase is more to the point, and compels the Japanese to seek their economic future in Asia. It is largely the same in Manchuria as in Shantung, where at one time American trade associations were declaring that the archives of the consulate at Tsingtau were filled with records that would prove Japanese discrimination against American goods. On investigation, the statement was found to be a pure fabrication. There was no record in the consulate of any discrimination against American firms in Shantung. The consul, however, did state in his official report to the state department "that if Americans and Europeans had not availed themselves of the many business opportunities in Shantung, it is because they were preoccupied with other more pressing and important matters arising out of the war." He concluded by stating "It has not been due to any unwillingness on the part of the Japanese authorities to extend privileges to others than their own nationals." The American consul then went on to state that the civil administrator of Tsingtau had offered all inducements so that American citizens could unite with Japanese in developing the commercial and industrial possibilities of the port.

The situation is very similar in Manchuria. Americans do not go there, because they have been taught to believe that competition with the Japanese is impossible, that all manner of obstacles will be placed in their way of doing business with the Chinese. There is no doubt from information that comes to us from reliable sources, that Japanese commercial competitors have helped to create this impression by bragging and menacing methods, but we are satisfied that this never reflected the policy of the Japanese government or that of the South Manchuria Railway authorities, and that, if the foreigner had taken his complaint direct to the proper authorities, there would have been no good reason for him to nurse a grouch. Foreigners, Americans especially, have permitted themselves to be guided by the experience of a few firms who harbor a lasting grievance against the Japanese, arising out of close competition in other parts of China. They have developed a clear case of "cold feet" in respect to Manchuria.

The declaration of the new president of the South Manchuria Railway should set at rest all these old stories, and Americans and British should take him at his word and co-operate for the common development of this wonderful region. If Manchuria, Mongolia and adjacent territories are to serve as the reservoir for the overflow of Japan's millions, an era of prosperity will come to the Far East such as will eclipse all past booms in other parts of the world. A company whose property is now valued at $700,000,000 gold, expending at least $15,000,000 a year is in America, and an equal amount in England and other countries, whose program calls for the expenditure of $200,000,000 in the next four years, whose trade in engineering supplies is more valuable than the whole of the Chinese railway system, is not going to jeopardize its success, by resorting to methods of discrimination, that, in the end, must earn for it the censure of other nationals and make difficult any important financial co-operation or loan negotiations. Manchuria, Mongolia are the lands of to-morrow, the lands of opportunity in Eastern Asia, where the present generation will witness a repetition of the great developments that followed the opening of the American Far West. The world should take Japan at her word, stop grouching, and come in and co-operate in the opening up of a new centre of industry and civilization.

* * *

What the Filipinos Really Wanted

THE Wood-Forbes mission has discovered that the Filipinos really wanted immediate *dinero* instead of immediate independence and they needed it now, if not sooner, in order to save themselves from going on the rocks of bankruptcy. A hurry-up call from General Wood got the money and now the Filipinos and Americans are clamoring for him to stay with them until the insular coffers are again replete with the cash that is expected to pour into them under his supervision of affairs. When this is accomplished, the Filipinos will probably once more set up the cry of independence with or without strings.

Our little flier into colonial administration without a fixed policy came nearly ending in a calamity, for had the idea of the last administration been carried out and the Filipinos given their independence, it would not have been long before they went on the rocks, and compelled to seek assistance from the international money-lender, with the fate of China as the inevitable aftermath.

Good old philanthropist is our uncle, after all is said and done, always with his hand in his pocket to help some one outside the country.

* * *

French Engineering in China

IN the last number of THE FAR EASTERN REVIEW we inadvertently referred to the Cie Génerale d'Extrême-Orient (awarded the second prize for the best design for the Yellow River bridge), as a Belgian concern, when, as a matter of fact, it is French, with head offices in Paris, and represents the strongest combination of French manufacturers that has ever entered the Chinese market. Especially is this true in the engineering sense, as the company are agents for several of the greatest French engineering houses, notable amongst which are the Société de Constructions des Batignolles, the foremost railway constructors in France, the builders of the Yunnan railway and of many others in French colonial possessions ; the Cie de Fives Lille, the world-famed engineers whose installations are models of efficiency; the Decauville, whose light railway specialties are standard throughout the world, and so on down a long list of French manufacturers, whose names are closely associated with the advance of France in engineering development, and allied with the strongest French financial institutions. Its entrance into the Chinese field and success in the bridge competition provides evidence of national activities following the armistice, and as one of the reasons underlying the remarkable recovery of French foreign trade in the current year due to a large extent to trade organization.

It may be accepted that the above combination represented by the Cie Générale d'Extrême-Orient will carefully watch and protect French engineering standards and specifications in the development of Chinese railways and other engineering undertakings. The head of the great Batignolles company, M. Eduouard Gouin, was the expert and representative of the French engineering interests who collaborated with the consortium in the initial negotiations looking towards the adoption of a standard set of specifications for Chinese railway rolling stock and accessories, and spokesman for those French interests who in the past have received so little benefits in the way of orders for materials, after having furnished nearly two-thirds of all the capital required for the construction of Chinese railways. All the Russian lines were built with French money, half, or perhaps two-thirds of the Belgian lines, were financed in France and one-half the interest in the Chinese Central Railways, Ltd., which constructed the British section of the Tientsin-Pukow Railway and holds the rights to the Pukow-Sinyang line are French, in addition to a quarter interest in the Canton-Hankow line. With the end of the war, and the necessity of building up French industries, one of the first matters that claimed the attention of the engineering trade, was to obtain, as far as possible, an equitable participation in the distribution of orders for materials from enterprises abroad that their capital had made possible.

France realized that to pay off the foreign indebtedness incurred during the war, she would have to systematically reorganize the country for the purpose of exporting products with which to pay for the materials of all kinds purchased during the war. One of the most notable steps to this end was the reorganization of the

French ministry of commerce, for the double purpose of co-ordinating private export efforts and of placing at the disposal of French foreign commerce, the information necessary to its efficient action. As a result of the law, a national foreign trade bureau was created, official foreign trade bureaus and French chambers of commerce organized in foreign countries, and commercial attachés and agents appointed to various countries. In other words, France set to work to follow the lead of Great Britain and America by creating all the necessary facilities for the proper expansion of their trade interests and co-operation with their merchants.

The national foreign trade bureau is organized in such a way that it can centralize economic information of all kinds which comes from the French commercial agents, chambers of commerce and other sources abroad and disseminate the information at once to interested manufacturers. The bureau also keeps foreign markets advised of the facilities provided by French manufacturers for meeting their requirements.

In addition to these official instruments for advancing their trade interests, a National Bank of Foreign Commerce was created under the law of March, 1920, for the special purpose of facilitating exports by advances on long term commercial paper or by allowing credits against various approved securities, and by placing at the disposition of French merchants information as to the financial standing of would-be purchasers.

The success of French merchants in selling their products abroad since the armistice has been greatly facilitated by these official aids, and when these have been further expanded and the French commercial agents abroad become more firmly settled in their work, greater results are confidently expected to accrue to the nation as a whole.

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Hongkong's Industrial Future

A SIDELIGHT on the reported activities of British interests in obtaining extensive coal mining rights in Kwantung province appears in a recent special number of *The Times*, whose correspondent in Hongkong reveals the formation of a powerful syndicate whose object is to exploit and develop the surrounding country from a coal-bearing and metal-producing aspect. Large concessions located in the new territory have already been obtained from the British government, and negotiations are still pending with the Canton government for concessions in the rich province of Kwangtung. According to this report, there is every prospect that within a short space of time coal and iron will be able to be delivered in Hongkong at prices which will cause little short of a revolution amongst the industrial interests of the Far East. The scheme is one, he says, which, if it matures, will effectively place Hongkong very prominently on the map of the world's big industrial centres. From the shipbuilding point of view, Hongkong, with its native labor, would then become a serious rival to even the world's biggest yards.

The scheme referred to by *The Times* correspondent is the one covered by the agreement entered into on April 23, 1920, by Major Louis Cassel on behalf of a Sino-British corporation called the Kwangtung Collieries, Limited, and the Canton military government represented by Mu Ying-hsin, military governor, for prospecting and working coal concessions in various specified districts of Kwangtung province. It is a Hongkong company capitalized at $10,000,000. The full details of this deal were given in the December 1920 number of THE FAR EASTERN REVIEW. It provides for a directorate of three "Europeans," three Chinese and one of "British nationality," elected by the others.

In response to a question asked by Mr. B. Kenyon in the house of commons on August 5, as to whether the government was aware that the concessions referred to established a practical mining monopoly and were opposed by the American group in the consortium, Mr. Cecil Harmsworth, the under secretary for foreign affairs replied that considerable misunderstanding existed as to the real nature of the concession and explained that:

"The agreement was not monopolistic, but confers prospecting rights for coal in certain districts.

"It allows fifteen months for selection of the mining areas and excludes 51 mines in these districts which are already granted to other parties.

"The concessionaires are not a British company but a Chino-British company formed on lines which have proved mutually beneficial elsewhere in China.

"The British firms interested include those of the highest standing in the Far East and the agreement represents years of effort.

"It will relieve Chinese and foreign shipping in South China from the serious handicap imposed by dependence on imported coal.

"The agreement has been negociated with the provincial authorities strictly in accordance with the Chinese government's rule that the terms must be settled with the provincial authorities before ratification by the central government.

"The British minister made a formal application for ratification on October 30th last but owing to certain difficulties the agreement was referred back for further discussion of the points in detail with the Canton authorities."

A change has taken place since then in the completion of the Canton government, and instead of the military being in power, Dr. Sun Yat-sen is at the head of a constitutional government, and, according to reports, is not in favor of endorsing the agreement, under whose terms an initial payment of $1,000,000 was handed over to the former officials.

Considerable light is thrown on the entire matter by the report of the economic resources committee which was appointed by the Hongkong government last year to study the economic resources of the colony with a view to their development. Reading between the lines of this excellent report it is easy to see that the Cassel concession is the key to the great industrial future of the colony by providing the coal that will permit the iron ore of the new territories to be converted into the steel that will, in turn, bring about the industrial revolution prophesied by *The Times* correspondent.

SHIPBUILDING—In reporting upon the possible expansion of the shipbuilding industry, the commission says that all supplies of materials, such as steel plates, sections, billets for forgings, pig iron for castings, etc., are imported from Britain or America. As compared with Great Britain, Hongkong is thus at least two months later in commencing work on a contract, due to the time required to ship materials out. In addition, the freight on materials adds at least 10 per cent. to their cost. Auxiliaries of a special nature are also purchased from home or America and are affected in the same way as steel by time of delivery and freight charges. Timber for decks, ceilings and cabin furniture, in the case of teak or hardwoods, is procured from Siam or Borneo, and soft wood, such as Oregon pine, from the Pacific coast. Timber cannot, however, be considered as costing more in Hongkong as Great Britain has to import both hard and soft woods. The foregoing are the principal items for which the colony has to rely on outside sources for supplies, but there are many other details in the outfit of a vessel which have to be purchased abroad and which, if the demand were sufficient, could be economically produced in Hongkong.

An important factor in the absolute determination as to whether shipbuilding in Hongkong is ever to be a progressive industry is the production of iron and steel in China. If this ever eventuates Hongkong as a shipbuilding centre will be well established.

In the event of minerals being procurable in South China, adds the report, steel works would have to be on a very large scale to cover the large variety of plates, sections, etc., used in shipbuilding. In Great Britain, steel works' output is specialized, some firms turning out plates only and other firms sections only.

Auxiliary machinery is specialized in by many firms in Great Britain and could only be turned out economically in Hongkong if the demand were sufficient.

Local China fir is only suitable for rough work. Whether supplies of suitable hardwoods to take the place of teak and Borneo hardwoods are procurable within easy reach of Hongkong, is a matter which might be investigated.

Freight rates on timber from Borneo to Hongkong have recently been reduced and timber merchants are increasing their plant with a view to a large output in the near future.

Pig iron, in large quantities, has been shipped from Calcutta to Japan, the Mitsui Bussan Kaisha being the principal shippers, and the material being used, it is said, for shipbuilding purposes in Japan. No doubt, the report adds, the government is kept fully advised for what other purposes it is used.

It has been proved that Hongkong is quite capable of building practically any type of merchant ship as cheaply as, or possibly cheaper than, any other country, Japan included. To be quite independent, however, cheap supplies of pig iron and coal to run rolling mills are necessary. *With a guaranteed supply of coal from nearby provinces in China, the question of the establishment of rolling mills is purely a matter of time*, and there would then remain only the question of auxiliary machinery. This, it is assumed, will have to be imported from England or the United States for some years to come, as Hongkong has neither the expert advice nor the facilities for manufacture.

LABOUR.—This is plentiful, but to maintain efficiency busy yards are essential. Efficiency has increased since the introduction of steel ships. In connection with apprentices, a system of technical education would prove of great benefit in the way of training them in modern practice. A study of the English language should be combined with their studies in engineering.

PUBLICITY.—The primary disability Hongkong labors under at present is that few shipping people at Home have any real idea of Hongkong's capacity for shipbuilding. This was particularly in evidence during the war when, with all the crying need for ships it was with the greatest difficulty, and only in the latter part of the war, that sufficient shipbuilding material was obtainable to keep the yards fully employed. Since then officials of shipbuilding firms in Great Britain and in America have inspected the local yards and have been very favorably impressed.

The possibilities of getting ships built and repaired in Hongkong should be kept very prominently before shipping people in Great Britain, America, Canada and Australia, and the colonial office should be well advised of the work done in Hongkong and the capabilities of the local yards When the colonial office were informed, towards the end of the war, practical results accrued.

The capabilities of Hongkong as a shipbuilding centre were also brought strongly before the Home authorities in 1917 when a Hongkong built vessel was docked in Liverpool for inspection and a number of experts were asked to express their views, which were very favorable.

MINING.—In discussing the possibilities for mining development, the commission says that it may be taken for granted that the island of Hongkong itself is devoid of minerals of economic value, but this is by no means true of the new territories. Here copper, silver-lead, tin, wolfram and iron have been discovered and large sums expended in the attempt to develop them. With the possible exception of iron ore their exploitation, however, has not turned out favorable. The iron ore deposit now being worked is of large extent and of excellent quality, and may one day prove of inestimable value to the colony. The exploitation of this deposit has been retarded by the absence of a suitable coke-making coal deposit. It is, however, the report goes on to say, extremely doubtful if a suitable coal deposit exists within the colony within reasonable distance of the iron and the chances of the Colony ever being supplied with iron made from local iron ore and melted with coke produced from local coal are extremely remote.

The activities of British interests in securing control over the most important coal deposits in the adjacent Chinese province of Kwangtung, and which, according to reports, resulted in their obtaining a practical monopoly of undeveloped coal deposits from the Canton government can be better appreciated after reading the above extracts from the report of the commission. The new territory has the iron but lacks the coal necessary to convert this into steel and lay the foundation of a great industrial future for the colony. Hence the negotiations to secure this necessary coal supply from Kwangtung.

Regarding the other minerals, the fact that previous attempts at development have not been encouraging does not necessarily postulate the absence of workable deposits, says the report. On the contrary, the knowledge of the existence of so many minerals prompts the belief that vigorous, intelligent and systematic prospecting might reveal ore occurrences of economic value. Such being the case, it appears to us that prospecting should be stimulated whenever, and wherever, possible.

After pointing out the deficiencies in the existing mining regulations which operate against profitable exploitation, the commission recommends the abolition of prospecting charges, a reduction on the rental of mining leases, and that the payment of a royalty on iron ore be abolished, or, failing this, a radical change in the present system of calculating royalties. The commission winds up its report by a recommendation to the government to employ the services of a geologist of repute to undertake a geological survey of the colony without delay.

OTHER INDUSTRIES.—The report also covers other industries and in its summing up of conditions the commission points out the possible danger to local prosperity by the general tendency towards increased wages on the part of all classes of skilled labor which with the high rents prevailing in the colony, tends to give an undue advantage to Canton. Especially is this so in the matter of small Chinese shipbuilding and repairing yards who have been driven to Canton because of the loss of their foreshore rights. Because of these cheaper conditions, Canton has already captured the motor-boat building trade formerly conducted in Hongkong.

The report points out that there is a large number of industries capable of great development amongst which vegetable oil extraction is cited as one of the most important. Tin smelting is carried on in Hongkong in a very primitive manner, and there is no reason why it should not be made a remunerative industry if conducted on scientific lines.

In the thriving township of Shamsuipo a cotton cloth weaving factory is in operation, the product of the factory finding ready sale in Hongkong and in the Straits Settlements. This industry, with cheap labor, should be capable of further development. Weaving and knitting factories are already established in the colony, and the government should give these every encouragement and assistance to enlarge the scope of their activities. This industry employs a large number of hands, and there is every indication that the number is on the ascending scale. Soap-making has vast possibilities before it if the South China market can be captured for the products of the local factories already in existence and of others in contemplation.

Untold wealth has been made out of silk both in Japan and South China, and there is no reason why Hongkong should not participate in the wonderful prosperity of the silk industry. While Canton raw silk is in some respects superior to the silk of other producing centres, yet at present the same attention is not given to the rearing of the silkworm and the winding of the raw silk as is paid in the sericultural districts of Europe and Japan.

For silk of the first quality for the export market a picul fetches under normal conditions considerably over $1,000, and for the second quality, if sold in Canton, from $600 to $800. Customs tariff, likin and inland taxation, freight rates, conveyance and incidental expenses, including discount on silver subsidiary coinage, account for no less than 20 per cent. of the cost if silk produced in the new territories is shipped to Canton for sale. If a ready market could be found in Hongkong the Hongkong product would not be penalized to the above extent. As far as can be ascertained, however, the local demand is next to nothing, excepting for export to the markets of America and Lyons.

It is to be hoped that sufficient enterprise might be encouraged in Hongkong for the establishment of a factory equipped with

modern appliances and machinery for all classes of hosiery, and so foster an industry which from experiments has been proved capable of successful results if undertaken under favorable conditions.

Rice polishing is another of the industries stimulated by the war. There are many ways and means of developing the industry so as to place Hongkong in a position to supply the large demands from California and South America. There is also scope for fruit-canning and meat-packing. Of comparatively recent date is the establishment of cigar and cigarette factories. These promise to rank among the leading industries of Hongkong.

The committee express the view that government assistance might be invoked for the starting of a cotton mill in Hongkong. It will be remembered that the Hongkong Cotton Spinning and Weaving Company, with a capital of a million dollars, started under the auspices of a leading British firm in Hongkong, went into liquidation because the mills could not be made to pay. The Hongkong mill was penalized through having to import cotton from the North of China.

If cotton could be grown in the new territories there would be better prospects of success for the fresh attempt to embark new capital in a cotton mill for Hongkong. The Chinese promoters desire government assistance, and there is no doubt that when the new company assumes concrete shape the Hongkong government will regard the enterprise sympathetically. What is desired in the first place is a suitable site, with a water supply not liable to stoppage in periods of drought such as occasionally occur in Hongkong.

Present Shipbuilding Activity.—Notwithstanding the depression in all other parts of the Far East, Hongkong shipbuilders are being kept busy, and at the present time there are over 44,759 tons building in three establishments alone.

Hongkong and Whampoa Dock.—On the stocks in the yards of the Hongkong and Whampoa Dock Company at Kowloon 26,000 tons are under construction. Four oil-tank steamer for the Anglo-Saxon Petroleum Company and a steamer for Messrs. Jardine, Matheson & Co., are the orders on hand. The oil-tankers will be sister-ships, each with a gross tonnage of 5,600 tons. They are designed on the Isherwood system of longitudinal framing. The first of the four—the *Paludina*—will be ready for launching early in September. She will have reciprocating engines. The others are named, *Petricola*, *Planorbis* and *Pleiodon*. It is expected that they will be let down the ways at intervals of about six weeks after the *Paludina* takes the water.

The steamer for Messrs. Jardine, Matheson & Co.—the *Kung Wo*—is a steel twin-screw vessel planned for a river trade. She has a gross tonnage of 4,400 tons. Launching of the ship will take place early in October if all be well.

Taikoo Dockyard.—The tonnage being constructed at the Taikoo Dockyard and Engineering Company's Works is 17,432 tons. The largest vessel on the ways is a steamer of 7,500 tons gross for the Blue Funnel Line. She will be fitted with a geared turbine engine.

Three steamers for the China Navigation Company are on the skids and a fourth is at the fitting-out wharf. The *Kwangtung*, a steel-screw vessel of 2,450 tons gross, has already been launched. Like several others building for the C.N.C. she will be equipped with geared turbines. Following her about the middle of September will be the steamer *Changsha*, a twin-screw ship with reciprocating engines of 2,482 tons gross, which will be utilized in a river service of the company. A third vessel, yet to be named, of 2,500 tons gross register having turbine machinery, is also being built for Messrs. Butterfield and Swire. The steamer nearing completion is the *Kwang Chow* of 2,500 tons gross. She will be the first of the company's coastal steamers built at Hongkong to have geared turbines. It is expected that she will be in commission in less than a month's time.

Two tow-boats for the Blue Funnel Line which are now almost completed are not included in the return, the vessels being under 100 tons registers.

Bailey's Yard.—Messrs. W. S. Bailey & Co. have building four large lighters with an aggregate tonnage of 1,327 tons, to say nothing of a number of smaller vessels, launches and lighters. One has been nearly completed and the other three are reaching the stage for taking the water. The first to undergo her trial trip will be the *Paz*, a twin-screw motorship of 167 tons. She has been ordered by a firm at Manila and will be taken there for harbor work when delivered. The other lighters are oil-tank barges for the Standard Oil Company. One is the *Delaware* of 600 tons and the second the *Brooklyn* of 360 tons. A steel-screw lighter of 200 tons ordered by the Java government is the fourth of the vessels.

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Japan's Fight for Iron

IN the article on Hongkong's Industrial Future, the fact is very forcibly emphasized that much depends upon the colony's acquiring a suitable coal supply to supplement the iron deposits which exist in the New Territory, and that this is to be obtained in the Chinese province of Kwangtung, thus explaining the activities of British agents in the early part of the year to acquire certain coal concessions from the Canton government for a period of 99 years. We are told that when this combination of iron ore and coal supply gets to work, there will come a revolution in Far Eastern industries.

Now comes the no less important announcement from Japan to the effect that Mr. Goro Matsukata and Dr. Asobu Naito have worked out and perfected a process whereby the heretofore refractory "magnetic sand" a form of magnitite, may be smelted at a very low cost. Their process, says the *Japan Times*, has been thoroughly tested on a practical scale and has demonstrated itself to the satisfaction of some of the leading metallurgists of the country, including government officials.

As there are in Japan vast deposits of this form of iron oxide, the new process, if it is all that is claimed for it, is of the very highest value to the Japanese nation, economically and politically. Through its use Japan may be made wholly independent of the outside world in respect to iron, the most necessary of all raw materials, and from being an importing nation of pig and steel, may become one of the great exporters. The figure quoted by the discoverers of this process, namely twenty-five yen a ton for iron through their furnaces, will permit Japan to undersell in every iron and steel market in the world.

The discovery, if it turns out to be all that is now claimed for it, will change Japan's economic condition completely. It will remove at once any necessity that now exists for Japan to turn to China as a source of iron and removes whatever temptation there may have been here to acquire the iron works and the iron deposits there.

It is to be hoped for the sake of Japan, that these prophecies will come true, and so relieve her of the great expense, not to speak of international friction, attending upon her further quest for iron and iron ore in other Asiatic countries. The victory in the struggle for commercial supremacy will inevitably go to that people who have abundant reserves of coal and iron. Hongkong is striving hard to find these raw materials which, it is hoped, will make her the leading industrial centre of Asia, and as will be seen from the report of the economic commission, is evidently keeping an eye on Japan's imports of iron and the purposes for which they are used.

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An American Shipping Policy

THE United States has passed through a trying ordeal in its endeavor to build up an American mercantile marine, and at this time is faced with the still more arduous task of operating it at a profit. Experts and would-be experts have declared that it cannot be done under government supervision and have advocated

the sale of the fine new ships to private companies, but when bids of only $20 per deadweight ton were offered from the highest bidders in open competition for some of the choicest vessels, the catastrophe that would have followed the dumping of 10,000,000 tons of shipping on the market can readily be imagined. The decision of the shipping board to limit the sale price of ships to around $200 per ton, when experts were clamoring to have them put on the block at $100 has undoubtedly preserved our mercantile marine from a blow that would have been felt for many years to come.

Slowly, very slowly, in the face of opposition from private and other interests, organization and system is superseding chaos in the management of the shipping board, and the idea is becoming firmly fixed in the minds of all Americans that whatever may be their views on the subject, the American mercantile marine is an accomplished fact, and they must maintain and support their own fleet. They realize, now that they are up against the keen, cut-throat competition of other nations, that they have reached that point in their industrial development where they must export at least 25 per cent. of their manufactured products or go under in the struggle for existence. Ships are necessary to deliver this surplus to the markets of the world. They must be patronized and maintained.

The Jones Bill has yet to be given a fair trial. On its face it is full of inconsistencies which will give rise to much friction, irritation and reprisals. Whether it can be successfully placed in operation is a question that can be answered only by carrying out its provisions, and then, if it fails after a fair trial, other legislation can be devised to meet the difficulties. The section of the Jones Bill which provides for preferential rail rates on goods carried in American bottoms, must certainly bring reprisals from other nations. Reports from Japan state that chambers of commerce in that country are backing a movement for preferential rates on the railways of Japan for Japanese goods shipped in Japanese bottoms. In addition, there is a move to send 10,000-ton cargo steamers direct from Japan to the Atlantic ports through the Panama canal as a first step to offset the provisions of the Jones Bill. The *Syren and Shipping*, the leading British marine publication, says that "while nothing is said about retaliation, obviously retaliation is the reason." In time, no doubt, the paper adds, "Senator Jones and his adherants will realize what they are doing, which is nothing else than pushing the American mercantile marine to destruction. The frog burst from a surplus of pride."

It is to be expected that the Jones Bill will meet with such criticisms and the opposition of all foreign shipping interests, which only the most determined and patriotic co-operation and co-ordination on the part of Americans can overcome. We may not like our fleet now that we have got it, but we have either to hold it or confess ourselves defeated in the greatest commercial struggle that the world has seen. Much will depend upon the new shipping board who have taken over the direction of our new mercantile marine. They are not all practical shipping men, in fact, some of them have only political recommendations for the position, but such as they are, they were picked by the president as the best men available, trained executives all, who will do their utmost to make a success out of a heart-breaking proposition. It requires some courage to take hold of and straighten out the tangle that has resulted from previous administrations.

At the head of this board stands a man conspicuous for his lack of technical marine knowledge, but, on the other hand, an administrator, a business man from the soles of his feet to the top of his crown.

THE NEW SHIPPING BOARD

Left to Right—Meyer Lissner, Los Angeles, Cal., Republican, Representing the Pacific Coast States; Rear-Admiral W. S. Benson, U.S.N., Atlanta, Ga., Democrat, Representing the Atlantic Coast States; T. V. O'Connor, Buffalo, N. Y., Republican, Representing the Great Lakes States; Albert D. Lasker, Chairman, Chicago, Ill., Republican, Representing the Interior; Hon. George F. Chamberlain, Portland, Ore., Democrat, Representing the Pacific Coast States; Frederick I. Thompson, Mobile, Ala., Democrat, Representing the Gulf States, and Edwin C. Flummer, Bath, Me., Republican, Representing the Atlantic Coast States.

Mr. Albert D. Lasker, the new chairman of the shipping board, is known best to the business world and to journalists as an advertising expert, who worked his way up from the office boy to be the sole proprietor of the world-famous advertising firm of Lord &

Albert D. Lasker

New Chairman of the United States Shipping Board

Thomas of Chicago, the man who made "Spearmint" a household word in five continents, and who has brought millions in returns to other manufacturers who went to him for expert advertising advice. Mr. Lasker is known as a worker, one, who, if necessary, does his 16 hours a day without grumbling. He will put into the shipping board that element of "pep" required to develop the American mercantile marine along lines that will find a lasting place in the affection of the American people.

The effects of his campaign is already being felt. The board has overturned the policy of Admiral Benson who refused to advertise its marine services, and throughout the world we now see the blazing advertising of the shipping board calling upon Americans to patronize their national undertaking. Americans should travel on American ships as a patriotic duty and be willing to suffer some inconvenience in time and accommodations to do this. On the Atlantic, on the Pacific, and on all the Seven Seas. American ships are now operating calling upon Americans to stop their knocking and get together and boost the new services and so assist the board to make good in serving the country and so advance the interests of every American residing in or doing business in foreign fields.

Y. Matsuoka

IN the shake-up of the South Manchuria Railway administration following charges of political favoritism and jobbery, one of the ablest and best known of the younger officials of the diplomatic service has been appointed to the new directorate. The appointment of Mr. Y. Matsuoka to this position comes as a recognition of valuable services rendered to his government in other directions. For many years he has been attached to the diplomatic service where he distinguished himself on many occasions when called upon to investigate and report on delicate international questions. At the Paris peace conference he had charge of the publicity and intelligence work of the Japanese delegation and became well known to the journalists of all countries for his willingness at all times to give accurate information and elucidate the position of his nation. Few indeed, are the Japanese who have such a ready command of English and ability to express themselves in that language. In this respect, Mr. Matsuoka is one of the most gifted, having passed several years of his early life preparing for the bar in a Michigan law office. His handling of the Japan's publicity at the peace conference earned the commendation of all newspapermen irrespective of nationality or politics. Returning from

Y. Matsuoka

A New Director of the South Manchuria Railway. One of the ablest of the Japan's younger diplomats

Paris, he was placed in charge of the press bureau of the foreign office, where, after a year of hard work, he was compelled to seek a rest. His promotion to the responsible position of director of the

South Manchuria Railway where he will have a still further opportunity for the exercise of his sound common sense and executive ability, must redound not only to the advantage of the railway but of Japanese interests in China as a whole.

* * *

Germans Back on the Job in China

IF the Germans are to pay the huge war indemnity they must work, produce, manufacture and dispose of their products in allied and neutral countries. To protect their own manufacturers the allied countries are raising their tariffs, inventing new ones and employing other artifices to make the payment as difficult as possible. The dominant political party in the United States is now advocating the assessment of *ad valorum* duties on imported goods on the basis of the American wholesaler's selling price on comparable competitive articles of domestic manufacture. This will apply to at least 75 per cent. of America's imports. Every order booked by the Germans in neutral markets, while assisting to cancel the war debt, deprives the allied manufacturer of that much profit. The great illusion surrounding the enormous demand upon Germany at the height of the peace conference is fast being dispelled in the light of trade developments. Already we hear of proposals that the reparations commission shall exercise its power of specifying the kind of goods in which Germany shall pay by demanding raw material instead of manufactured goods, and which is met by a prompt protest in the German press, who, notwithstanding the immense reduction in the total of the debt involved in the proposition, see in the move a plan for hamstringing German industry. The controversy centering around this proposition is intensely interesting for if it goes on we shall see the Germans insisting on paying and the allies by every possible means seeking to avoid being paid. The ultimate outcome of this struggle must be that the allies will grow sick of their bargain, and will take no forcible measures to enforce it.

Nowhere in the world has the German comeback been so rapid as in China, and on all sides we hear of their successful competition in large engineering contracts, in which they invariably are 40 to 50 per cent. lower than American prices. We are informed that in the competition for a cotton mill where the American tender was 800,000 taels, the German price was 400,000 taels on the same specifications. It is reported that eleven complete electric light plants have been booked by the Germans in China in the past six months, in competition with Americans and British manufacturers, in fact the cream of this business has gone to them, and, according to the *North-China Daily News*, they have been equally successful in obtaining orders for cement plants.

The German position in China has been materially strengthened as a result of the treaty which puts them on an equal footing with other nationals and guarantees most-favored-nation treatment and customs reciprocity between the two countries. German trademarks are restored to the original proprietors and German subjects are to pay no taxes not paid by natives of China. Germany engages to fill her obligations to China under the treaty of Versailles, but in addition promises to pay a lump sum as indemnity and in reimbursement of the internment expenses of Germans in China during the war.

The provision in the treaty placing German subjects under the jurisdiction of Chinese courts is a long step forward.

This, however, is not the only important provision of the treaty. It releases all German property to original owners, and it has enabled the reopening of the Deutsch-Asiatische Bank's branches in China at the very time when French prestige in China suffers a severe blow through the failure of the Banque Industrielle de Chine.

That part of the private arrangement between China and Germany concerning the liquidation of former German property in China met with the prompt action by the allied reparation commission. Under Article 260 of the treaty of Versailles the reparation commission is empowered, within a year after the treaty comes into force, to call upon Germany to buy up all rights and interests possessed by its subjects in all public service enterprises, and in all concessions in Russia, China, Austria, Bulgaria and Turkey or their dependencies, and transfer them to the reparation commission, together with any interests the German state may itself possess in such countries, it being left to Germany to indemnify her subjects for any loss that they may suffer from such transfer.

The *Morning Post* reports that the reparation commission called on Germany to comply with this part of the Versailles treaty, whereupon it was found that the Berlin government had found yet another way of escaping the fulfilment of its obligations by taking advantage of the argument that, so far as Article 260 applies to China, the whole situation has been modified by reason of the fact that China refused to sign the treaty. Under the separate treaty of peace signed between China and Germany on May 21 an arrangement has been come to under which the German government has undertaken to pay to China fifty per cent. of the value of German property situated in China and so far not liquidated. In consideration of this payment the property that has not yet been disposed of is to be handed back to its original owners. The amount involved is enormous, as it is estimated that barely one-eleventh of the German property in China has so far been disposed of by the Chinese government, and this one-eleventh represents a value of 1,200,000 taels. Under the arrangement come to between Germany and China the payment to be made by the German government will take the form of four million silver dollars spot cash, while the balance will be paid in the form of bonds issued by Chinese railways.

The reparation commission insists that this private arrangement between the Chinese government and Germany cannot in any way invalidate the right of the allies under the treaty of Versailles, and a commission of bankers is now deliberating as to the method by which German property in China may be transferred to the allies.

Commenting on the documents that have just been published by the German government in regard to its settlement with China the *Temps* characterises the disclosures made therein as veritable revelations. The Chinese government, it appears, first requested Germany to recognize the Versailles treaty in its entirety in order to retain the rights it would have acquired had it signed when the rest of the allies did. In his reply to this demand the German plenipotentiary wrote insisting that the "German government could not now repeal a general recognition of the Versailles treaty, for such a step would be prejudicial to the ulterior revision of the treaty."

These disclosures help to accentuate once more the close understanding which has always existed between China and Germany, and the difficulty confronting other nationals in dislodging her from this position. The facts revealed by the reports from Paris show the Chinese government on the one hand requesting Germany to recognize the treaty in its entirety in order to retain rights it would have acquired had it signed at the same time as the other powers. On the other hand we find the Chinese government refusing to negotiate with Japan over the final disposition of Shantung because it was not a signatory of the treaty which recognized Japan's position.

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Advertising Statecraft

SUCCESS in business goes hand in hand with judicious advertising. Diplomacy is the biggest kind of big business. What the display advertisement is to commerce, the information article released by governments is to politics. At no previous period of the world's history has publicity been more general or its influence more potential than at the present time. Propagandists, press agents and publicity bureaus are active as never before in the struggle for the spotlight and diplomats vie with each other for space on the first page of the newspaper. Under the

old order of world politics battleships, batallions and bayonets stood behind the diplomat, but his success to-day depends upon public approval, which may only be gained through publicity, in some form or other. When diplomacy fails, and the people are again asked to pay the supreme sacrifice they will demand that all the facts on both sides of the case be placed before them. Never again will the civilized world be railroaded into a war to conceal the stupidity, idealism or venality of so-called diplomats and statesmen or to gratify the gross partiality of newspaper writers. War is the most expensive business in the world and should be prevented at all hazards. Propaganda that will bring about a peaceful and honorable solution to differences between nations, is a most praiseworthy and humanitarian undertaking, a part of the new diplomacy which holds that it is better to pay for publicity to prevent war, than to await the declaration of hostilities and then squander millions in the dissemination of bigoted and biassed information in order to discredit the other side.

Statesmen of the past were circumscribed in their influence because publicity had not in their day, widened the circle of their audience to its present proportions. The speeches of Premier Lloyd George, President Harding, Premier Hara and others now appear side by side in the morning paper, each seeking to sway public sentiment through a subtle system of psychology which reached such a high state of development during the late war. It was, however, overworked by the Germans, and lacking finesse, defeated its own purpose. Since the war there has been an increase of propaganda to accomplish certain ends. The chief danger lies in overdoing it. Publicity defeats its own purpose when it does violence to the truth. The basis of all good and effective advertising is the truth. The printed statement which conceals or distorts the facts, carries with it its own condemnation, whether employed to serve the purposes of trade or diplomacy.

Up to the outbreak of the great war, the "Biggest Business in the World" managed from Washington, steadily frowned on any publicity to elucidate its foreign policies. In order to properly excuse his own pacifist tendencies, President Wilson went on record that America's delay in entering the war arose from the necessity of educating the American people to the importance of the issues involved, thus implying that much propaganda was essential to arouse the nation to a sense of its obligations, and that the credit for this campaign of education belonged to himself and the democratic administration. The full measure of President Wilson's belief in propaganda did not, however, manifest itself until after the nation had entered the war, and then, freed from congressional restraint, he entered upon a publicity campaign that will go down in history as the most extensive, audacious and expensive propagation of an ideal ever conceived and carried out. Twelve million dollars were wasted in a vain attempt to prepare the world for a Wilsonian peace. The thought naturally arises, that if these millions had been expended before the war in an honest effort to educate the people of the world to the fundamental issues at stake, the great catastrophe might have been averted. If one-tenth that amount were now expended in proper publicity concerning aims and aspirations in the Pacific and Asia, much future trouble might be avoided.

The example of Wilson has been followed by our Philippine wards, and only recently they voted and appropriated a million pesos of the public money to conduct a propaganda in the United States looking towards their immediate independence. The answer of the Harding administration has been prompt and the Wood-Forbes mission will inform the nation whether or not the million peso propaganda campaign is founded on fact. All preliminary reports from the islands, indicate that the facts as ascertained on the ground fail to uphold the arguments spread broadcast by the propaganda agents. We have here a case, where failure to adhere to truth will undoubtedly carry with it its own condemnation, and Philippine independence set back another generation.

These truths are borne home to us at the present time because of the reported activity on all sides in China to prepare for the Pacific conference. It follows the dismal failure of the mission of Mr. Lenox Simpson and the activities of Mr. Thomas Millard to work up a war scare over the renewal of the Anglo-Japanese alliance. They failed because they did not adhere to the truth. The facts of the situation in China are before all the world, and no amount of glossing over on the part of skilled publicists or gifted diplomats can alter by one iota the truth that is apparent to every foreigner in the country. China is entitled to and should conduct a vigorous publicity campaign to place her position fairly before the world. She has many friends, predisposed in her favor, but whose hands are tied, because of the utterly irresponsible activities of publicists, who conceal their real position behind some advisership to some bureau or other in Peking, and whose main efforts are directed in moulding a public opinion favorable to the clique which pays them a salary. The higher interests of China become secondary to the interests of the politicians or militarists who pay the bills.

It was not long ago that the Japanese government announced its decision to engage the services of a foreign adviser to its publicity bureau, in the person of Mr. Frederick Moore, at one time Peking correspondent of the Associated Press. In commenting on this departure in publicity methods, the *Japan Times* says

"In engaging an adviser for the publicity bureau, Japan is doing what China has so successfully done, but in a different way, and a decidedly better way. In Peking it is the custom to retain foreign correspondents under salary, attaching them to various bureaux and departments as advisers. Their work is not so much to advise their particular bureau chiefs as it is to see that the papers they correspond for get the 'right' sort of 'news.' They are not known as salaried press agents for China, but that is what some of them are. Mr. Moore's position is of quite a different nature and he will only draw the one salary."

This embraces a truth that should be taken to heart by the Chinese. Here, a small coterie of writers closely associated as advisers with high government officials or factional chiefs, have been working along lines that could only tend to widen the breach between Japan and the United States. It would be a good thing if China would come out into the open, and, like Japan, announce her decision to employ a regular foreign publicity expert to direct and accept responsibility for her political propaganda. There is no good reason why China should not have a good strong publicity organization to present her side of international disputes before the world. There can be no just criticism against properly conducted official publicity. The opposition to China arises largely from the fact, that she employs these so-called experts under the guise of advisers of sorts, and, when they misstate facts and are found out, the Chinese government immediately repudiates them, declaring that the adviser-journalist in question, is acting entirely as a private individual whose views are not held by the government.

The world, and especially other journalists in China, will view with greater sympathy, a Chinese publicity system that works in the open, with some responsible official head who will have the respect of his colleagues. The policy pursued by China in the past, and especially during the last two years, can only defeat its own ends. Deviation from the facts, playing with the truth and inciting international discord, will eventually bring its own reward. The Philippines are a case in point. The same keen, clear visioned observers, who have reported on the Philippine situation will carry home their report on conditions in China. No amount of propaganda can hide the deplorable state of internal affairs in this country, nor can it get under the skin of these unsentimental Americans upon whose findings will be based to a large extent the future policy of the American government.

We have before us a pamphlet entitled "Sino-Japanese Relations" marked "Confidential," circulated by an important international association in China, which is on its face, propaganda calculated to incite international discord and discredit Japan. It bears the press mark of an important publishing house in Tientsin, from whence other similar "confidential" propaganda has emanated

and been circulated throughout China in the endeavor to destroy the usefulness of a publication which holds opposite views. These pamphlets, holding Japan up to scorn and ridicule, are still being circulated with the word "Confidential" deleted. All the members of the Wood-Forbes mission were carefully furnished with copies, anonymously, of course, through the mail. This is the sort of propaganda and publicity that is injuring the cause of China, and the Peking authorities will be well advised to seek some other method of publicity and repudiate publicists who can find no other way to operate except through such undignified methods. Come out into the open.

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The Passing of a Mitsui

MR. Yonosuke Mitsui, president of the Mitsui Bussan Kaisha, Japan's greatest trading concern, passed away in Tokyo on August 9th last. The head of this world-wide organization, he was probably the most powerful factor in the whole commercial world, as few indeed are the foreign companies whose turn-over equals that of the premier Japanese concern whose affairs he directed. Like most of the members of this princely house he rarely came under the limelight, the world knowing only the managers and chiefs of departments who directs the activities of the organization. It is difficult to single out any one member of the Mitsui family for special credit in the building up of their immense business, as several are now directing the various ramifications of their immense interests.

The Mitsui family have surrounded themselves with the best executives and business talent that can be found in Japan.

To Mr. Yonosuke Mitsui, however, belongs credit for being one of the founders and active directors of the Mitsui Bussan Kaisha, which has grown since its inception in 1876 to its present position as the largest trading concern in the world, through whose hands passes more than one-fifth of the total import and export trade of Japan, a business that runs into the colossal sum of one billion good dollars annually.

The chief object of the Mitsui Bussan Kaisha, when it was launched, was to engage in the direct import and export trade of Japan with foreign countries, which at that time was entirely in the hands of foreign merchants at treaty ports. The company's initial capital was Gold $500,000 but as its business expanded by leaps and bounds the original capital soon became inadequate to cope with the situation and it was therefore raised to Gold $10,000,-000 in 1909 and subsequently, in February, 1918 to Gold $50,000,-000—fully paid up.

The principal article of the company's export trade are raw silk, silk textiles, coal, cotton and cotton products, timber, beans, cereals, flour, sugar, copper and other metals, oils, camphor, matches, canned goods, tea, sulphur and miscellaneous goods.

The company is perhaps the largest handler of raw silk in the world, supplying a fourth of Japanese silk exported to America, all besides supplying European markets. It also controls 40 per cent. of Japan's entire output of coal. The credit of having been the first exporter of Manchurian beans to Europe and of lumber to America and Europe must also be awarded to the company. The company's principal imports are raw cotton, sugar, machinery of all kinds, ships, steel bridges, locomotives and railway equipment, steel, iron, rice, wool, dyes, drugs, timber and a long list of raw materials.

Though the Mitsui Bussan Kaisha owns a fleet of 29 large steamers aggregating over 120,600 tons for its exclusive use these are nevertheless wholly inadequate for the company's requirements and it is one of the greatest charterers of tonnage in London and the East.

It has its own dockyard for building and repairing steamers.

The late Mr. Yonosuke Mitsui has also acted as the chairman of the board of the Sakei Celluloid Company, auditor of the Toshin Warehouse Company, and was one of the founders of the great Kanegafuchi Spinning Company whose affairs he directed as president and director for several years. He leaves a record of work accomplished that has hardly been surpassed by many better known "Captains of Industry" in other countries whose success has been attained more through successful stock manipulations than through actual creative ability. The Mitsui enterprises stand to-day as one of the bulwarks of Japan's prosperity. With its financial colleague, the Yokohama Specie Bank, created to finance Japan's foreign trade, the Mitsui Bussan Kaisha, the pioneer trading firm, stand for all that is best in Japan. They have led the way and blazed the trail that others are now following. The story of Mitsui is an epic in the commercial history of the world. Its founder and president who passes away, leaves a monument that must evoke the praise and admiration of all competitors, and serve as a guide and model for generations to come in his own country.

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Hongkong Needs Boosting

UNLESS possessed of an inquisitive mind and a bent for exploration the average visitor to Hongkong will depart without having really seen one of the beauty spots of the Far East. There is no one to tell him of the advances made by the colony, no literature, no free pamphlets setting forth its advantages as a health or rest resort, no advertising, and few people that will volunteer information. All the requirements for making the island one of the most popular resorts in Asia are there, but Hongkongites do not seem to be specially desirous of letting the rest of the world know anything about them, quite content to struggle along on the past reputation of the port as a commercial centre.

The terminal station of the Kowloon-Canton Railway stands as a landmark in Hongkong harbor, a beautiful building which is not appreciated until the explorer passes through the gates to the train platform and marks with surprise and delight the garden-like arrangement of the grounds with its grass and flower beds, something different, to the dirt dust and bustle of other terminals. It seems a pity that this line is not more generally patronized by the traveling public, as it passes through a district of exceptional scenic beauty.

An automobile trip around the island of Hongkong is one to be remembered. Next to the world-famed Columbia River Drive, there is nothing that can compare with it for scenic beauty and thrills. The beautiful Repulse Bay Hotel and beach has no equal in the whole Orient. It stands by itself, a pearl hidden in an oyster awaiting discovery. It is the same with a trip over the beautiful roads of the New Territory. Some day the government of Hongkong will awaken out of its sleep of conservatism, and fall in line with other enterprising localities and advertise its many advantages, not only industrial, but those that make for profitable tourist traffic. If it were not for the Hongkong hotel management, the traveler would never hear of the motor trip around the island made possible by the excellent work of the public works department in constructing the highway.

It is the same to a large extent with the railway, which passes through a territory whose beauties are left to the traveler to discover after he has mustered up courage enough to brave the trip against all the warnings of friends who urge him to go to Canton by the boat, "so much more comfortable you know."

It is perhaps unfair to criticize British methods in Hongkong, as there is little to call forth such criticism, except in so far as it relates to a hidebound conservatism which seems to take special delight in concealing the good things they have under a bushel basket. Hongkong certainly needs boosting.

"Trade Follows the Loan"

THE campaign to carry American firms into China on the top wave of the war-export boom is having its after-effects in more ways than the one pointed out by the Shanghai commissioner of customs and emphasized by a more recent warning in the *Commerce Reports*. Disappointed Americans who flocked to China in answer to the call, have laid their failure to British competitors, who, they declare, have almost a monopoly on China's engineering business. As a result, we learn that the president of the Engineers' Club of Washington is organizing a party of no less than 500 American engineers who will visit China to study on the ground the reasons for British trade success in engineering products.

Apparently American engineers are not satisfied with the mass of propaganda literature that has poured into their offices, and are coming over to see for themselves why they have failed to get all that business they have been assured was here awaiting them. All this is the outcome of "Dangerous Propaganda," which, if persisted in, will result in Americans putting more money into China than they will ever take out. The amount of money sunk here in the past two years, will weigh heavy in the balance against the profits that will accrue to American firms for many years to come.

During the past year Americans have freely contributed $7,500,000 for Chinese famine relief; add to this another $5,000,000 for the regular expenditures on missions, colleges, hospitals and charities, then the sums lost by firms who swarmed in here in response to the call of the booster, the past and present expenses of the American group, without counting the losses incurred by banks and commercial firms in the recent crash, we will have a total of somewhere near $15,000,000. With the recent losses of the Philippine National Bank and other prominent American concerns, this may be easily increased another $10,000,000, or a grand total of $25,000,000 of American money from all sources, that has found a safe deposit in China this past year. This represents ten per cent. on $250,000,000. If we attempt to convert this into terms that the engineer will understand, it means that Americans would have to lend to China the enormous sum of $500,000,000 for railway construction in order to obtain orders for materials that will bring $25,000,000 in profits to our manufacturers.

If we should add to this the losses of previous years, of moneys sunk in chasing the will-o'-the-wisp of Chinese concessions, prospecting, investigating and exploring, the expenses of those who have devoted their time and energy to financing impossible Chinese political wild-cat schemes, the losses incurred in the Canton-Hankow Railway, the Standard Oil plunge into the Shensi oil fields, the Siems-Carey *fiasco*, the expenses of the Fitch mineral survey, the Carnegie Researches, the present Andrews expedition into Mongolia, and down the line through other less spectacular missions, and it would not be far from the truth to state that another $15,000,000 has disappeared in unproductive Chinese work.

In other words, it may be fairly stated that during the past fifteen years, Americans have sunk at least $40,000,000 in China (without counting the annual charge for the upkeep of missions, colleges, hospitals, etc.), a sum which represents an investment on the part of Americans of $800,000,000 in Chinese Government Railway bonds, in order that American manufacturers might profit to that extent from the sale of equipment. And now to cap this record, it is seriously proposed to send 500 American engineers to China to make an investigation that will entail an expenditure of at least $4,000 per head, $2,000,000 poured into seive of Chinese delusions, the profits on $20,000,000 in orders for engineering materials, an equivalent to a $40,000,000 Chinese railway loan. Where will the madness end?

It is perhaps too late to counteract the effect of this propaganda, but we will venture once more to give our American engineering readers and advertisers a short treatise on successful business methods in China. Our experience covers a period of eighteen years, and is not only the opinion of a trained observer, but that of a practical engineer and contractor. As one engineer to another, we will indulge in "straight talk." There has been too much flubdub handed out to American manufacturers these past four years, and it is time that some cold, hard, business facts were placed before them. Naturally, our ideas will not coincide with those of the boosters, publicity agencies and such firms as depend upon the representation fees of manufacturers in order to exist. There is one fundamental truth that will explain the situation to the common-sense American engineer; that is:

If this truth be grasped, American engineers can save their money and forego their contemplated visit, 500 strong, in order to ascertain why the British are successful. For many, many years the British have been putting money into China. So have the Belgians, the Germans, the Japanese and other far-sighted European nations compelled to seek profitable foreign fields for the investment of their surplus capital. They made a close study of China. Whenever the opportunity presented to take up a railway or industrial loan they did not hesitate because of a lack of knowledge of the country. They accepted the axiom that a railway between any two points in China must pay, if properly managed. They took what was offered and then trusted to an agreement that would secure to them extensions, additions, etc. They lost no time in entering into a preliminary agreement, knowing that with such a document in their possession, their government would protect their rights and the final agreement would be signed to their satisfaction. In this manner the British have financed railways, mines and industries. So have others. They did not insist at the outset on sending a special commission out to China to study and investigate on a proposition before signing a preliminary agreement. They made certain of their position, filed their agreement with their foreign offices and waited until such time as the Chinese were willing to discuss details. That is the secret of British success in China.

Americans have not invested in China. They have talked about it for many years. They stand exactly where they stood in 1898 at the commencement of the "Battle for Concessions." They refused to take to heart the lesson that others had profited by, and invariably insisted upon making a most careful and searching inquiry into any Chinese proposition, before accepting a preliminary agreement for building a railway or developing a mine. They lost some of the richest concessions because of this.

From the time that Americans tried to pry the Japanese out of Manchuria, down to the Siems-Carey and Federal Wireless contracts, it has been one long succession of deals in which they have insisted upon forcing open some old door or other that led into the preserves of the other fellow. There have been all kinds of wonderful opportunities in China for American capital, but legitimate openings have been ignored in order to seek concessions that raised the issue of the "open door" with some other nation. The culmination of these tactics came when impractical advisers led Mr. Carey to accept a railway contract during the war which raised the issue of the "open door" with all the allies when they were fighting for their existence in Europe. The consequence? The allies came together in defense of their interests, and Americans found, after two years of trying to beat the combination, that there was no place left in China where they could construct a railway without infringing rights previously granted by China to other powers. The inevitable outcome is the consortium, the only way in which American capital can now co-operate in the development of China's railways. Instead of seeking legitimate openings, Americans invariably have taken over contracts and concessions loaded with dynamite, if not intentionally, then Chinese officials shrewdly saw to it that we picked a good, juicy lemon in order to compel the American government to support its traditional doctrine. If Americans had been more concerned about actual business than in trying to pry open these closed doors, by this time China would have been criss-crossed with railways built from the proceeds of American loans and furnishing a profitable market for American engineering products. This is the TRUTH devoid of all trimmings. The American manufacturer

will never learn it from others, as nearly everyone responsible for their failure are still prominently before the public posing as authorities on how to do business in China. They will shirk the truth, and justify their own inexperience by laying the blame to spheres of interest, discrimination, and a set purpose on the part of other nations to keep Americans out. American failure is simply the result of one long campaign of sentiment. The proof of it all lies in the fact that after twenty years of pulling ourselves up by the boot-straps, we have not one single Chinese government loan contract or concession that can be pointed to as a success. Outside the quarter interest of the American group in the Hukwang Railway Loan, our assets simmer down to as fine a collection of trouble-making contracts as were ever devised to set one nation against the other.

There is no need for an investigation on the part of American engineers as to why the British succeed in China. In the above facts rest the answer. If an investigation is to be made, in order to save time and money, let us suggest that it be made in Washington and New York. American engineers may then learn who has been responsible for *fiasco* after *fiasco* which deprived them of a legitimate market in China.

British loans carried with them an obligation on the part of the borrower to purchase British materials. Likewise, other nations operated on the same principle. Belgium's foreign investments have assured to her the trade that is now pulling her through the period of reconstruction. Even Germany is benefitting through her pre-war investments and connections. British capital in railways, mines, mills and ships opened a market for their machinery, for repairs, renewals and extensions.

There is a tendency to attribute the *post bellum* success of British engineering firms in China to superiority of their equipment, a tendency seen in a recent editorial in the *North-China Daily News*, where it discusses "long-service plants" *versus* "lightly-built-short service-plants." This, of course, opens up an old discussion on the relative merits of British and American machinery, which, as a matter of fact, has little or no bearing on the question. The products of both countries will find purchasers. Britain excels in many lines of machinery, America in others. Germany specializes in certain lines while the Japanese are coming rapidly to the front along others. With the British, however, the situation is this. During the six years of the war British machinery plants were converted into munitions factories operated night and day with the labor of the women and children in order that the men at the front could win the war. They had nothing to sell. Americans, Japanese, Swedes and others came into China and took all the business offered. Now that conditions are normalized and the British manufacturer is able to fill orders, he is reaping what was sown for him in the past, collecting accrued interest on national investments. This is the secret of British success at this time.

Americans can flood China with new firms, their travelling agents may swarm all over the country in the search for new business, but until such time as the people at home are ready to put real money into China, the bulk of the engineering orders will go to those who have made the heaviest investments in the country. When Americans have a few hundred millions invested in railways, mines and other enterprises in China, they will get a much larger share of the engineering business, provided, that the investment carries with it the obligation to purchase American materials. If this fundamental axiom is forgotten, the other fellow will reap the benefit of American altruism.

We do not wish it to be understood that Americans are not succeeding in China. We simply desire to invite attention to a fundamental defect that militates against any great increase in engineering business. Americans are succeeding in China, especially where, during the war, they financed new undertakings or gave long credits. These initial plants call for repeat orders, repairs and accessories. Americans are also obtaining a fair share of the engineering business in competition with others on the merits of their products and because of service. But the strain of this competition especially at this time, with Germany and Belgium again in the field, is great. Not every firm can stand it. Americans are working under handicaps, but the greatest and most difficult to overcome is the fact that they have no financial stake in the country. Americans have the friendship of the Chinese, they look to us for moral leadership. We encouraged them to believe during the past few years, that under given circumstances we would fight their battles for them. But this does not bring engineering business to American manufacturers. Sentiment cannot overcome the meaning of the cold type in loan agreements or the obligations hidden behind foreign banking credits or advances.

During the war when European nations who advanced the loans for the construction of Chinese railways could not supply their requirements, American manufacturers were called upon to make good the deficiency. Now that conditions are normal, the loan provisions which provide preferential treatment for the products of the nations supplying the loans, will automatically close this door to the American manufacturer. The result of the tenders opened recently at Peking for railway rolling stock is an indication of what Americans have to face in the strenuous *post bellum* struggle for trade.

There is a tendency just now for Americans to quibble over the meaning of these European loan terms, and to insist that they should be given equal opportunity in the supply of materials. A very worthy and laudable work in behalf of the American manufacturers, one which, ten years ago, THE FAR EASTERN REVIEW also labored for. But, after all, it is unsportsmanlike. It is the other fellow's money loaned for the express purpose of benefitting national industries by opening a market for their materials. They need that market now, and by all rules of the game, Americans should not poach on their preserves. It is up to Americans to go and do likewise, by investing real money in productive enterprises. If we insist on contributing millions to China for purely educational and missionary work, and waste our efforts in blocking those, who, compelled to seek and create markets, were more far-sighted, and then attempt to jimmy our way into a share of their legitimate profits, we may as well forget all the talk about co-operation and undying friendship with our late allies. It won't work.

While Americans have been discussing these matters, the British have been steadily pursuing their objective, and financed many high-grade propositions in the past two years that expands the market for their engineering products. To take a case in point, there is the British loan to the Peking-Mukden line, and the other day we were informed that an additional $850,000 were loaned by the British to purchase supplies for another railway. The Kailan Mining Administration is building a steel furnace in North China, the Kwantung Collieries, Ltd., have an option on most of the coal mines in Kwangtung in order to assure the coal supply that will make possible a steel industry in Kowloon. The British obtained the first option on furnishing the Chinese with aircraft and notwithstanding protests that the contract infringed the "open door" doctrine, an American firm was afterwards given the option to furnish the Chinese navy with aircraft along lines similar to the British contract, that is, by lending the Chinese the money to buy the planes with. The wireless contract is another instance. Three other powers have protested, but the American government stands firm in its intention to support it. It is now a matter of finance. The Siems-Carey contracts for the Grand Canal and several railways are hung-up because of lack of finance. All along the line we find that the British have quietly found the funds necessary for carrying out propositions that will open a market for their products, and all along the line we find that Americans have failed to find the finance that will open the door to profitable engineering business.

Only by including Manchuria in the Chinese field can Americans say that they have dominated the engineering business. The figures show that the Japanese South Manchuria Railway Company have purchased American engineering products to the extent of $75,000,000 in the past twelve years, or equivalent to the aggregate business that has gone to Europe as a result of loaning

the funds for railway construction to China. This business has come to us as a matter of good-will and despite the agitation against Japan. European nations had to invest $150,000,000 in China to obtain the same amount of engineering business that was handed to us on a silver platter by the Japanese. The Manchurian market stands by itself. The Japanese are expending at least $20,000,000 this year in American products for the South Manchuria Railway and propose to spend another $100,000,000 or so in the next few years on American machinery for the expansion of their coal and iron mines and steel works. Their program calls for the expenditure of $200,000,000 in the next few years for Manchurian development. The bulk of the engineering orders will go to American manufacturers. To obtain this amount of business in China, Americans would have to lend the Chinese government the sum of $400,000,000 and then have a hard and fast clause in the loan contract that the materials would be purchased in America. As we have objected to the clauses in other loan agreements which closed the door to our products, other nations in turn will insist on the same privilege whenever we lend money to China for railway construction.

If American engineers are anxious for business, and cannot await until the consortium begins to function to get their share of orders for materials for Chinese railways, then our advice is to cultivate the Japanese in Manchuria. Our exclusion laws have forced these enterprising people into Asia, into Manchuria, where they are making a heroic effort to develop its rich natural resources. They have created a wonderful market for American engineering products. Within the next five years they will double and treble the orders that have come to us in the past from this part of the world. Help them develop this market. It has cost us nothing in the past. We can well afford to work in with them in this part of the Far East. If we don't, others will, and the result will be that the most promising and valuable market in Asia for American engineering products will be lost, and our manufacturers will have to await such time as the consortium gets down to work, and then compete with five other nations for our share of the business. These are facts which speak for themselves, sound advice, which, if heeded, will save the expenditure of $2,000,000 in investigating the Chinese engineering field on the part of the 500 American engineers.

Until such time as Americans throw overboard their sentimental pilots, eschew politics and get down to business by putting real money into productive Chinese enterprises, there will be no marked change for the better. The other fellow who was here first and financed the railways and mines and tied up the Chinese through advances and compromised to buy his materials, will continue to get the cream of the engineering business. It is not a question of the superiority of British or any other methods, but the application of a maxim handed down from old Methuselah, a maxim which all other nations except America have learned by heart. It is the rock upon which has been built the great export trade of nations whose limited home markets compel them to control foreign outlets for their products or go under in the struggle for existence. "TRADE FOLLOWS THE LOAN."

G. B. R.

* * *

Japan's Weakness

In a recent interview, Marquis Okuma placed his finger on the weak spot in presenting Japan's case to the world when he said :

"The Japanese stand in a seriously disadvantageous position as regards propaganda. The Japanese are not only bad speakers of foreign languages, but peculiarly reserved. They ought to learn to speak more boldly and straightforwardly when dealing with foreign friends. The Japanese should always be ready to insist on the maintenance of their own legitimately-acquired rights and interests, which they are bound to protect at all cost."

The venerable statesman is right, for despite the current idea concerning the extent of Japanese political propaganda there is little evidence of its efficiency. The Japanese as a people are most reserved and reticent, and their difficulty in expressing themselves in English has been the cause of many misunderstandings. Placed in a most delicate international political position, it has not always been prudent or possible for her diplomats and publicists to speak out plainly on concrete policies and explain their side of the case to the world.

This situation has been aggravated by the absence of a sympathetic foreign press. No other country in the world would tolerate for a minute the continued existence of a bitterly critical and at times openly hostile foreign press from which editors in other countries absorb their impressions of its people, its government, its institutions and policies. Even in the land of free thought, the lid had to be clamped down on the hyphenated press and instances are on record where the plant of such newspapers have gone up in smoke and their editors ridden out of town on a rail, for much less provocation than Japan has had to endure in the past few years. Most of the anti-Japanese arguments can be traced to the editorials and articles appearing in a well-known foreign-owned and edited newspaper, and the fact that it is permitted to continue, should be sufficient proof that Japan is not only tolerant but even ahead of other countries in its treatment of the press.

The picture is presented to the world of a great nation of 70,000,000 people, one of the five world powers, possessing no adequate means of making its voice felt or its policies understood, for the reason that world opinion is formed and influenced by the English-language press. The nation that cannot command free access to this great force, and whose policies are misrepresented, condemned or constantly criticised by the English newspapers published within its borders, is handicapped and out of the race at the start.

It has taken the Japanese a long time to awaken to this fundamental truth, and, as a first step towards recovering lost ground, have acquired control of the *Japan Times*, which will henceforth present Japanese policies and events to the world from the purely Japanese viewpoint. It is a step in the right direction, one that, if followed up, will do more to clear up the misconceptions concerning Japan than any other method of publicity. No Asiatic nation or government can expect to have its policies properly presented, unless it first has the confidence and sympathy of its foreign language newspapers whose first duty should be the defense of interests from which they derive support. The fact that Japan continues to permit such publications to exist, is the most convincing proof of her tolerance and forbearance under great provocation.

* * *

Consortium Still Alive

In answer to stories circulated in New York that the consortium was "threatened" by conditions existing in Peking and that its headquarters were to be removed from New York to London, Mr. Thomas W. Lamont gave out the following information to the newspapers:—

"The story is bosh, just plain bosh," replied Mr. Lamont, who went to China as the representative of the American banking houses interested in the consortium. "There has been no trouble over the consortium. It never had any headquarters in New York city, and the return to this country of Frederick W. Stevens, the representative in China of the American participants in the consortium, is not due to any such causes as are alleged, but solely to the fact that he has been given a holiday and told to take a rest after his heavy labors in China.

"The meetings of the participants in the consortium have been held in London, in Paris and in New York. It was a matter of simple courtesy to the American participants that the last meeting was held in New York city. It was resolved to hold the next meeting in London for similar reasons. There have been no 'developments' in Peking that have disturbed the progress of the consortium or threatened its existence. The suggestion that there has been friction of such a character as to interfere with the arrangements for the consortium is nonsense. There has been no friction, and Mr. Stevens's trip here has no such origin."

THE MANILA RAILWAY

Some Sidelights on its Management

THE traffic review in the report of the general manager of the Manila Railway for the year ending December 31, 1920 complains that passenger rates remained as promulgated in 1915, and increased costs and wages makes an increase in rates inevitable so the directors accordingly recommended an increase of 13 per cent. for third-class fares and 25 per cent. for first-class to take effect January 1st of the current year. Attention is invited to the distressing fact that the first-class passenger service is being maintained for the convenience of ten per cent. of the traveling public and operated at a loss. This report was written in the early part of the year, or at a time when it looked as though native control, as the outcome of the Wilson policies, was to be definitely established One wonders, after reading the concise statement in the report of the Manila Railroad whether the president of the Philippine government operated line was not paving the way for additional votes for the independence party ?

Progress in one direction seems to have a baneful effect in another, for with the building of good roads in the Islands and the inevitable entrance of the motor truck into the transportation field, the railway was hard hit, as was clearly indicated by traffic census figures. As compared with the same month the year previous the railroad suffered a decrease in traffic of 14,000 passengers for six stations on the main line north. For the same period motor truck traffic showed a corresponding increase in passenger travel over an improved parallel highway.

The transportation problem, says the report, should be approached from the standpoint of the welfare of the entire public. There is no doubt that in many localities conditions are such that the motor truck offers advantages over other classes of transportation. A correlation of all transportation agencies therefore appears the only solution in the interest of both the public and the vested public utilities. To quote an eminent authority "each suitable agency of transportation should be employed (and protected by the government) to the extent that it is economically desirable. To be more specific, where a given expenditure, applied to water transportation, will provide for the movement of traffic offered at a lower economic cost, including interest on investment and cost of maintenance, than would be the case if an equal investment were made in any other transportation agency, then in such cases the water transportation should be developed." If the auto truck operating as a common carrier is taxed with a view to reimbursing

Aerial View of Findo Station and Yards, Manila Railway

the government for the wear and tear it occasions to the road surface, plus its proportionate share of the interest on investment in the highway, then the problem is automatically solved.

Conditions are further aggravated, says the general manager, by the fact that highway authorities have failed to recognize the necessity for improved roadways between populated centres and railway stations. Many of our principal stations are inaccessible during the rainy season owing to the deplorable condition of their approaches from improved highways and municipal government centres.

The present situation, he declares, is untenable and in the absence of an adequate tax measure the government is confronted with the alternative of subsidizing its rail and water lines or restricting the operation of trucks to non-competing routes.

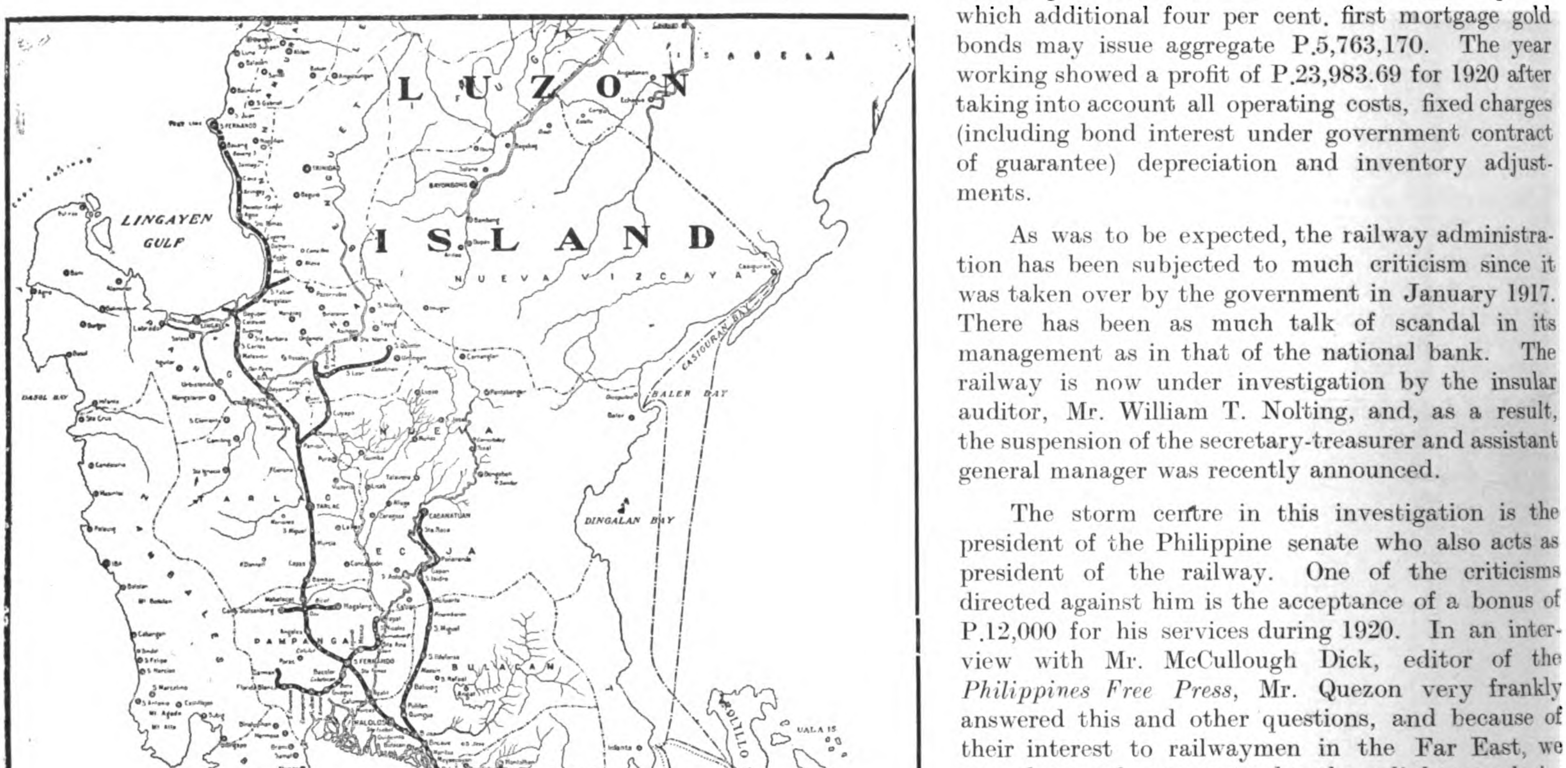
The motor truck owners have organized themselves to fight the "grasping railway monopoly," and the politicians are now placed between the devil and the deep sea. If they bolster-up the railway against the transportation companies, the votes of the latter will defeat them at the polls, on the other hand, if the politicos fail to make the railway pay, it will be held against them as proof of incompetence and inexperience.

It seems to be a situation where the Filipino politician, in his anxiety to get all the revenue producing-public enterprises into his hands, have over-reached themselves.

Through appropriations of the insular government the subscribed capital stock has been increased to P.20,127,000 and further increased this year by P.2,000,000 under Act 2960 of the Philippine legislature. The funded debt has been increased to P.54,278,000. The expenditures on the southern lines against which additional four per cent. first mortgage gold bonds may issue aggregate P.5,763,170. The year working showed a profit of P.23,983.69 for 1920 after taking into account all operating costs, fixed charges (including bond interest under government contract of guarantee) depreciation and inventory adjustments.

As was to be expected, the railway administration has been subjected to much criticism since it was taken over by the government in January 1917. There has been as much talk of scandal in its management as in that of the national bank. The railway is now under investigation by the insular auditor, Mr. William T. Nolting, and, as a result, the suspension of the secretary-treasurer and assistant general manager was recently announced.

The storm centre in this investigation is the president of the Philippine senate who also acts as president of the railway. One of the criticisms directed against him is the acceptance of a bonus of P.12,000 for his services during 1920. In an interview with Mr. McCullough Dick, editor of the *Philippines Free Press*, Mr. Quezon very frankly answered this and other questions, and because of their interest to railwaymen in the Far East, we reproduce such parts as tend to throw light on salaries and allowances.



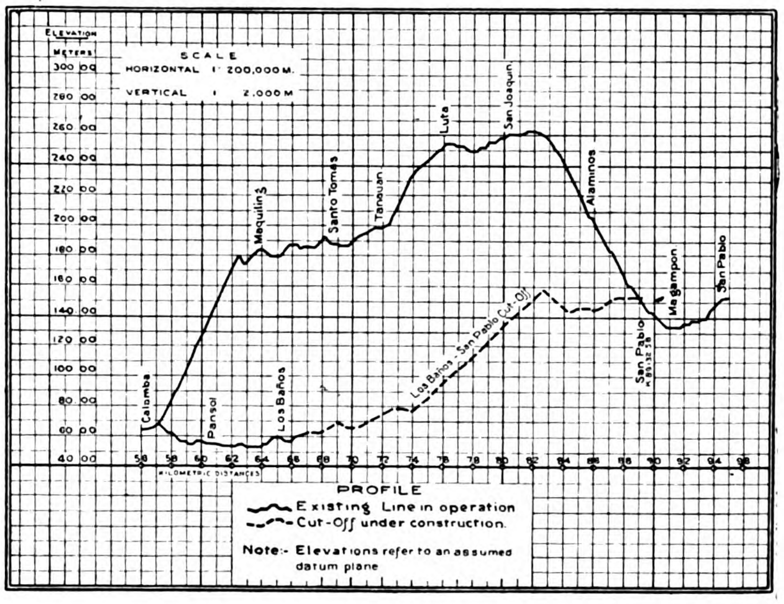
Map of the Manila Railroad Company's Lines

"It is, of course," said Mr. Quezon, "a delicate matter for me to speak about. However, considering that the former president, Mr. Higgins, received P.40,000 a year, which with free house, light, water, servants, etc., came to really about P.50,000 a year it was not excessive. Of course I realize that Mr. Higgins was an expert railroad man of long and valuable experience, and that he devoted all his time to the railroad company. However, the office carries with it, even in my case, quite a measure of responsibility."

"For attending meetings of the board of directors, the members, including myself, receive only P.20 each meeting, of which there are about twelve a year. That amount is the same as the directors used to receive when the railroad was under British control. It should be stated also that in the old days Mr. Metcalf, as vice-president and chairman of the board, in New York, with hardly any work to do, received P.15,000 a year.

"Prior to 1918, when the government took control, the compensation for the president of the Manila Railroad Company cannot be estimated, as he was also general manager. The first year I was president of the company, I received a bonus, as president, of only P.6,000. The next year it was increased to P.8,000, and last year it was made the P.12,000 already referred to.

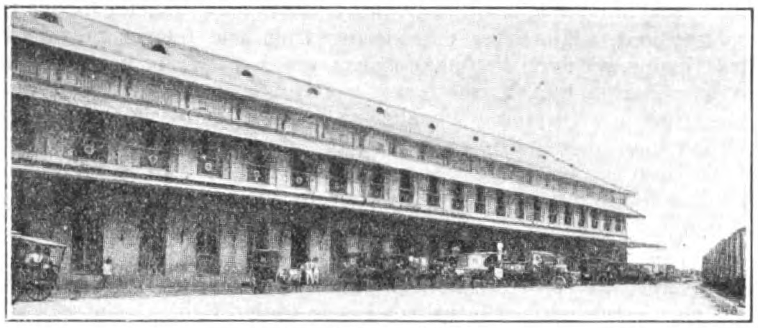
"In talking with Governor General Yeater about the matter, he said he thought it would be much better if the president of the railroad company were to be paid a regular salary. I told him that the practice followed is the old Spanish system, which provided



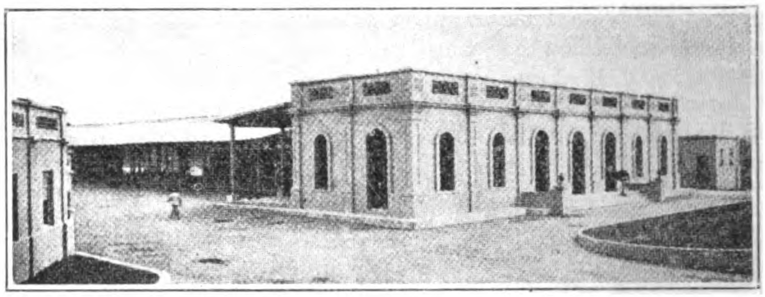
for bonuses rather than salaries, or bonus and salaries, for directors of companies or corporations. This practice, I understand, obtains also with some of the English banks here, and also, I have heard, with some railroad companies in the United States, which pay the president both salary and bonus. Governor Yeater said he thought that there would be less carping, at least among Americans, if the P.12,000 were paid as salary rather than as a bonus, as Americans were accustomed to the salary idea. That may be true. Supposing that the salary of the president of the railroad company were put at P.12,000 a year, do you think anybody could say it was excessive? And I feel that I do a great deal more for the P.12,000 than Mr. Metcalf, the former vice-president and chairman of the board in New York, did for his P.15,000 a year.

"Moreover, a comparative statement will show that the total salaries for the present administration, which is supposed to be so extravagant, are less than under the English administration. In the old days what may be called the administrative staff cost the company P.713,283.43 as against P.526,980.00 to-day, making a net economy of P.186,303.43 annually. This P.526,980.00 includes all administrative officials, staff employes, department heads and their principal assistants.

"I forgot to state that under the former administration, besides the P.15,000 annual compensation received by Mr. Metcalf as vice-president and chairman of the board in New York, the board employed a secretary at P. 5,000 annually and a stenographer



New Express Wing



Dagupan Station—Old and New (Estacion de Dagupan—Vieja Y Nueva)

at P.2,500 annually. For such meetings General McIntyre was allowed P.50 and Colonel Walcutt was allowed P.40, for expenses, in addition to their per diems of P.20. In the case of General McIntyre, the annual compensation, therefore, was P.1,080. In short, the board of directors under the English management, in addition to their per diems, received annually P.27,200 as against the P.5,000 in 1918, the P.6,000 in 1919, and the P.12,000 in 1920, allowed me. Surely nobody will say that is excessive or like looting the company."

Another interesting piece of general business information is contained in the answer of Mr. Quezon to the accusations that he made large sums from influencing the coal contracts of the railway, which, according to the report of the Manila testing laboratory (found elsewhere in this number of THE FAR EASTERN REVIEW) aggregate 80,000 tons per annum. In answer to this charge, Mr. Quezon gave out for publication an official memorandum on the coal contracts of the railway, prepared by the general manager, which follows:

Paco Station, Manila

"The contract under which coal was being delivered at the time the present management took over the railroad called for 50,000 tons of Chaokochwang coal at a price of $6.00 Chinese currency per ton, f.o.b. mines, plus 10 per cent. commission for Madrigal & Co. The seized German vessels were employed in transporting this coal.

The first bids for coal under the present management were opened on April 11th, 1918.

Madrigal & Company bid—

30,000 tons at P.47.45 per ton c.i.f. Manila Bay.

30,000 tons at P.49.00 per ton c.i.f. Manila Bay.

Mitsui Bussan Kaisha, Ltd.—

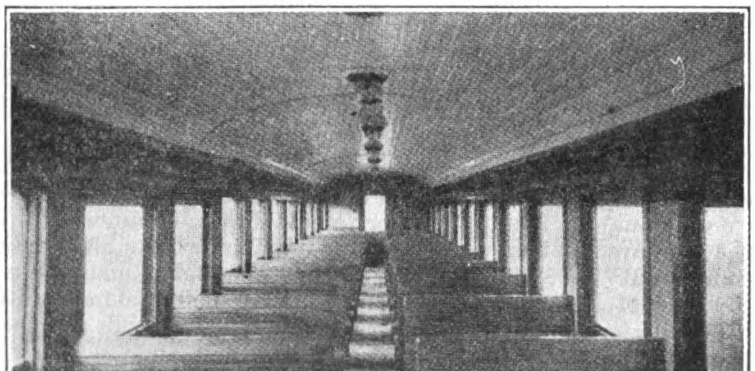
60,000 tons at P.55.50 per ton c.i.f. Manila Bay.

Both bids were on standard specifications. The fact that Macondray & Co., Inc., J. B. Redfern & Co., Ltd., and Sy Cong Bieng & Co. asked for particulars re specifications clearly shows that due publicity was given to the advertisement. These three firms later advised that they were unable to enter into competition. It will be seen that Madrigal & Company offered by far the most advantageous bid and the contract was accordingly awarded to them.

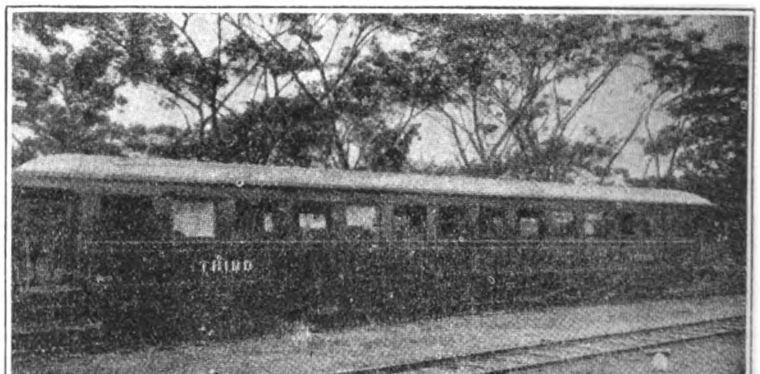
Coal deliveries were next requested under circular proposal for 15,000 tons, bids to be opened April 21, 1919. Five bids were received, the most advantageous offer being that of Macondray & Company at P.38.50 per ton c.i.f. Manila Bay. On this occasion the Madrigal & Company bid was P.40.00 per ton. The contract was accordingly awarded to Macondray & Company.

Coal deliveries were again requested under circular proposal and opened on June 27, 1919. Two bids were received, one from Mitsui Bussan Kaisha, Ltd. for 30,000 tons at P.39.20 per ton c.i.f. Manila and the other bid from Madrigal & Company for 30,000 tons at P.38.00 per ton c.i.f. Manila. The Manila testing laboratory, under letter of July 15th, 1919, recommended that the contract be awarded to Madrigal & Company, their bid being the most advantageous. Macondray & Company were unable to bid on account of lack of water transportation.

Coal deliveries were next requested under circular proposal for 50,000 tons. Bids were opened on December 5, 1919. Only two bids were received. Mitsui Bussan Kaisha, Ltd. offered a price of P.46.50 per ton c.i.f. Manila Bay, while Madrigal's offer was P.45.00 per ton c.i.f. Manila Bay, both bids being on Japanese coal. Madrigal & Company offered to substitute, in the event of a shortage of coal in Japan, Australian coal at P.52.00 per ton



Interior View



New Third Class Coach

or Indian coal at P.48.00 per ton. The bid of Madrigal & Company was accepted as the most advantageous. This contract was later amended (April 30th, 1920) to read "100,000 tons Australian coal with 7,400 guaranteed calories and 6 per cent. ash, at P.46.00 per ton." After completing approximately one-third of this contract, Madrigal & Company voluntarily offered to make a further reduction to P.38.00 per ton. Through the amended contract and voluntary reduction the Railroad Company made a saving of approximately P.78.000. Recently Madrigal & Co. made a further reduction of P3.00 per ton on 20,000 tons remaining to be delivered under the original contract, with a further saving for the Railroad Company of P.60,000, or a total of P.848,000. In addition, Madrigal & Company waived a bonus of approximately P.69,000, and paid penalties of approximately P.17,000.

Having reference to the contract recently awarded, bids were duly called for under public advertisement for between 40,000 and 80,000 tons of coal. Eight firms and individuals entered into competition. Compared on an equal basis, Madrigal & Company were again found to be the lowest bidders at P.22.35 per ton c.i.f. Manila Bay. The contract was accordingly awarded to Madrigal & Company for 50,000 tons.

These bids were opened by the secretary-treasurer and tabulated by the purchasing agent. They were then submitted to the Manila testing laboratory for comment and recommendation. After due consideration a committee consisting of the general manager, secretary-treasurer and purchasing agent recommended to the board of directors the acceptance of the Madrigal & Company bid as most advantageous. All bidders have had access to our records and been advised of the conditions on which the award was made.

(Sgd.) E. J. Westerhouse,
General Manager.

When the government acquired control over the road in January 1917, it took over a deficit of P.1,500,000. At the end of last year the road showed a profit of P.23,983 on a total investment of P 73,-343,095. Authorized capital stock has been issued to the value of P.20,127,000, and the line has a bonded indebtedness of P.26,472,000 first mortgage five per cent. gold bonds on the northern lines, and P.27,806,000 in 4 per cent. gold bonds on the southern lines, a total of P.54,278,000. Since assuming ownership the government directorate has recognized the necessity for a betterment of the yards, station buildings, rolling stock, and a further extension of lines for the more rapid economic development of the country. A number of the most important station buildings have been repaired, remodeled and rebuilt, and the Manila terminal facilities enlarged and the car movement increased over fifty per cent.

The most important extension is embraced in the construction of the Legaspi lines to Naga and from there to the port of Raqay at an estimated cost of P.6,000,000, and the main line extension south to the Guinaganyan River. The Naga extension was completed and placed in operation on April 1st, 1920, and the Guinaganyan extension was expected to be placed in operation of June of this year. The extension of the Cabanatuan line to Ilagan, Isabella province, at a cost of P.24,000,000 is also urgently needed in order to tap and develop the great agricultural resources of the Cagayan and Nueva Vizcaya valleys. The most important piece of construction has been the Los Banos-San Pablo cut-off, which also is rapidly nearing completion. The length of this cut-off is 21.8 kilometres with a maximum grade of 1 per cent. compensated as against a 2.5 per cent. adverse grade on the present line through Luta. The new line will be 5.8 kilometres shorter with an estimated economy in operation of P.500,000 annually. The estimated cost of this work is P.1.000,000.

The several sugar centrals and other industrial concerns have made necessary the construction of many new spurs and sidings,

Mount Mayon, the Most Perfect Volcanic Cone in the World, Albay Province, on the Line of the Manila Railway

and to afford adequate facilities for the handling of express cargo an extension was built to the east wing of the Tondo main station building at Manila with a ground floor area of 12.64 by 42.64 metres. This building is of reinforced concrete, Truscon design, with steel roof framing and iron roof, and cost P.102,624, exclusive of plumbing, painting and fixtures. A feature of the new work in the past year was the replacing of 710 wooden poles by reinforced concrete poles at a total cost of P.59,221.

Delivery of the twenty-five new third-class coaches was effected late in 1920. All wood work is of Philippine hardwood (Ipil) sized and finished in our Caloocan shops. Each coach will have a seating capacity of 156 passengers.

Thirty new locomotives were contracted for under the following conditions :—

AMERICAN LOCOMOTIVE COMPANY

TYPE.	COST.	Initial payments, January 1, 1921.	Annual payments, January 3, 1922-23-24-25-26.
Mountain 171-180 (62729-62738)	$537,000	$134,670	$163,000 puls 7 per cent. interest semi-annually.
Santa Fe 201-210 (62739-62748)	550,800	138,130	

H. K. PORTER COMPANY

TYPE.	COST.	Initial payments, March 1, 1921.	Annual payments, March 1, 1922-23-24-25-26.
Wheeler (6624-6633)	$360,150	$90,150	$54,000 plus 7 per cent. interest semi-annually.

Deliveries began early in 1921 and continue at the rate of five locomotives each month until the entire order has been filled. It will be observed that payments extend over a period of five years under very favorable conditions, deferred payments being guaranteed under a chattel mortgage agreement with the manufacturer.

Practically all imported materials and supplies are purchased through Mr. H. L. Hershey, Philippine government purchasing agent in the United States with offices in the Whitehall Building, New York.

The lines as now operated offer travelers and sightseers an opportunity at a moderate cost and within a limited time to observe at close range practically every phase of provincial life in the tropics. For the northern trip the Baguio express leaves Manila station daily at 8 00 a.m. The first important stop is at Malolos, the seat of the first Filipino republic. Enroute the traveler passes first through a densely populated community of small farmers dedicated to the planting of rice. There the land holdings are so limited in size that no machinery is employed in either the planting or harvesting of the rice crop.

After Malolos the line extends through the heart of Pampanga, a sugar-producing province where cane fields are largely in evidence. Modern sugar centrals are projected and in course of construction which will materially increase the already heavy traffic over the company's lines. The extent to which this may develop is best realized when we consider that the Pampanga acreage to the growing of sugar-cane actually exceeds the total cane acreage of the Hawaiian group.

Continuing his journey the traveler passes through Tarlac and Pangasinan, the granary of the Philippines and the source of the Company's greatest revenue. At Mangaldan the Benguet Auto Line connects with the "express" and lands the travelers in Baguio well before dark. If he chooses, however, he may continue to the railroad terminal at Bauang and then proceed to Baguio over the scenic Naguilian Road. This course takes him through the tobacco fields of La Union, second only in extent to those of the Cagayan Valley.

Of the branch lines the Cabanatuan extension is by far the most productive in revenue for the Company. This line will eventually extend into the Cagayan Valley through Nueva Vizcaya. With the construction of the Cabanatuan branch, the province of Nueva Ecija had an influx of settlers, became second in the production of rice and promises to surpass Pangasinan in the near future. Travelers can now make the trip to Cabanatuan without change and return to Manila the same day. In the harvesting of rice modern machinery is there used and extensive areas are cultivated in single tracts making the trip of special interest to tourists.

The main line south offers a special attraction for tourists in that the route extends through a veritable coconut forest embracing the provinces of Laguna and Tayabas. A daily service is maintained on this run, the "Bicol Express" operating between Manila and Hondagua on the Pacific coast. Connection is made with the Pagsanjan and Batangas branches, both including points of special interest.

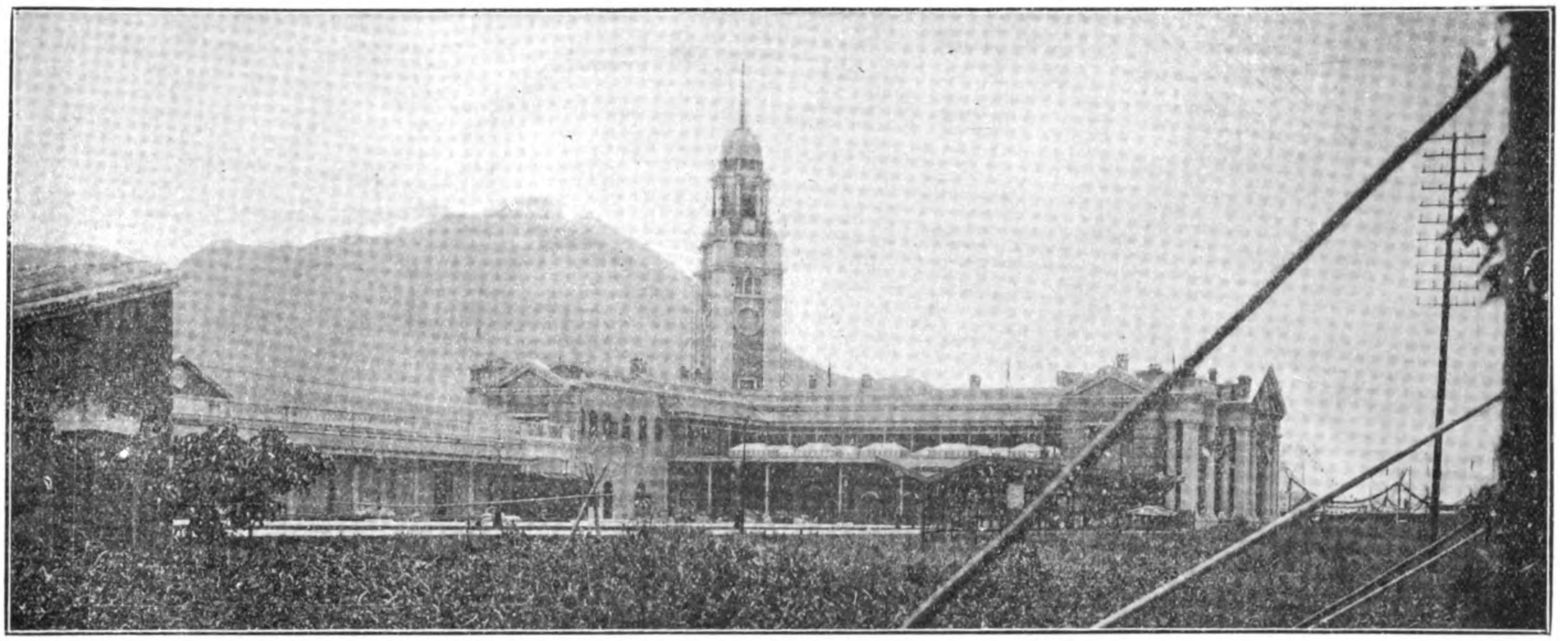
When the lines are completed through to Legaspi and the tourist can be brought through the wonderland of palms and coconuts to the base of the beautiful Mayon volcano, one of the sights of the world, it will undoubtedly provide an added inducement for visitors to spend more time in the islands. With this in view, the Railway directorate has determined upon a plan to construct a chain of hotels along its lines for the convenience and accommodation of the traveling public.

The Company recognizes that, by providing good hotels at the remote and beautiful places along its routes, many tourists and holiday makers will be attracted to points distant from their homes, and increased passenger traffic will result. These hotels will afford temporary lodging for the traveler bent upon errands of business and will afford a place of rest and recreation for those whose object is sight-seeing and pleasure. Because of the objectionable feature of noise, vibration and dirt, it is planned to build apart from the stations, away from the tracks, and not abutting directly on the railway lines.

A New Type of Shallow Draft Vessel

Considerable interest is being shown in the skimming boat which Messrs. Yarrow & Company, of Glasgow, Scotland, are running on the Clyde, both river and firth, and which is propelled by an aeroplane type petrol engine and air propeller. The hull is of the hydroplane type.

The Yarrow Skimming Boat at a Speed of 50 Miles Per Hour



New Terminal Station and Administrative Offices of the Kowloon-Canton Railway at Kowloon

Kowloon-Canton Railway, British Section

THE report of the Kowloon-Canton Railway for 1920 shows receipts from all sources of $520,176 an increase of $30,000 over the previous year. This slight advantage is offset by the steady rise in costs for materials, labor, etc., sending the total working expenses up to $487,144, and leaving a surplus for the year of only $33,032. With a capital investment which now stands at $14,710,-917 the showing must be far from satisfactory for the colonial government who owns and operates the road and must emphasize the necessity of creating industries and developing the resources not only of the New Territories, but of the adjoining province of Kwangtung, in order to bring an adequate return on the investment. Reference to the article on "Hongkong's Industrial Future," appearing in another part of this number of THE FAR EASTERN REVIEW, will indicate that if the projected iron and coal mining enterprises are carried out, a brilliant future will open up for the Railway. No great prosperity can, however, come to the line, until the Canton-Hankow Railway is completed, and the products of Hunan and Kwangtung find an outlet to the sea. Much will hinge, however, on the ultimate outcome of plans and dreams now indulged in by Dr. Sun Yat-sen and other Chinese authorities for the transformation of Canton into a deep-water port and railway terminus. If these plans prevail, then the future prosperity of the British section of the Kowloon-Canton line must be sought in the development of districts served by the line, and this will hinge largely on the success of the schemes for the exploitation of coal mines in Kwangtung that in turn will permit the establishment of an iron and steel industry in the New Territories.

The railway, report which we have overlooked in the above digression, goes on to give the usual cold looking figures necessary for the government auditor and inquisitive ratepayers, which do their best to deprive the document of interest to the man in the street. However, Mr. Winslow says that the local traffic earnings for the year have improved.

The receipts amounted to $194,041.14 against $179,434.14 or $14,607.00 more than the previous year, the increase being under passenger receipts. Through and joint sectional traffic receipts were $318,345.37, an increase of $16,017.63 when compared with 1919. The gross receipts for the year were $520,176.10, as against $490,092.77 for 1919, an increase of $30,083.33.

The balance after paying working expenses stands at $33,032.06 which is $40,028.57 less than the previous year. This difference, however, is more than accounted for by the general increase in salaries granted to the staff, the high cost of coal, and sleeper renewals mentioned in previous paragraphs.

For the past 5 years the results are as follows :—

	Gross Receipts.	*Working Expenses.*	*Net Receipts*
1916 ...	...$366,215.67	$296,691.63	$69,524.04
1917 ...	... 428,246.46	337,431.48	90,814.98
1918 ...	... 433,274.43	356,221.07	77,053.36
1919 ...	... 490,092.77	417,032.14	73,060.63
1920 ...	... 520,176.10	487,144.04	33,032.06

The through and joint sectional passengers carried in 1920 were as follows : Passengers booked by station in British Territory to stations in China 365,665 : Passengers booked by stations in China to stations in British Territory 373,776. The local passengers carried were as follows: Main Line, 392,206 ; Fanling Branch, 47,787.

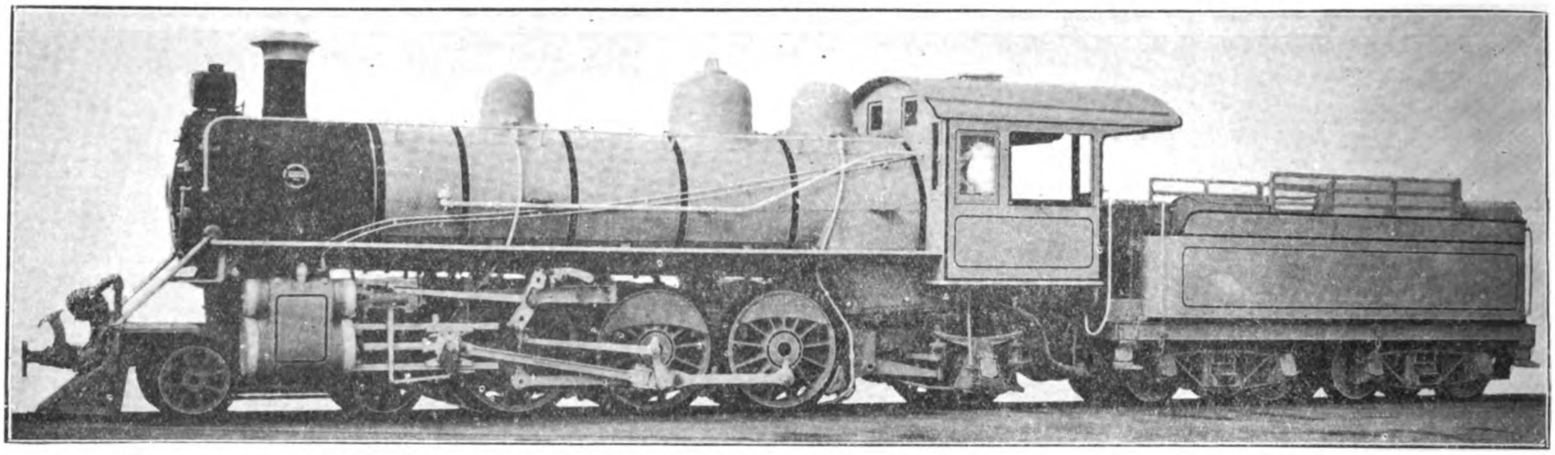
Locomotives.—There were no additions to rolling stock during the year. There are thirteen locomotives eight of which are "Kitson Clarke" 2:6:4 side tank 19" by 26" cylinder, with a tractive force of 27.724-lbs., weight 89 tons and 15 cwts.; 2 "Hudswell" saddle tank 0:6:0, cyl. 14 by 20-ft., 10,604-lbs. tractive force, weight 29 tons and 7 cwt. ; 2 "Hudswell Clarke," side tank 0:4:0, 5 tons and 3 cwts. weight for the 2 foot gauge ; and one Orenstein Koppel 0:4:0, 10 tons for the 2-foot gauge.

Coaches.—There are a total of 28 coaches for the standard gauge main line as follows :

1 first-class saloon coach, 2 first-class dining cars, 1 first-class carriage, 2 second-class carriages, 4 first and second composite carriages, 14 third-class carriages, 4 third luggage and brake.

In addition there are 6 coaches for the 2-foot gauge as follows :

1 eight wheeled bogie first-class carriage ; 1 eight wheeled bogie first-class and brake ; 1 eight wheeled third-class and carriage ; 1 eight wheeled third-class and brake van.



4-6-2 Type of Locomotive Supplied to the F.M.S. Railways by the Baldwin Locomotive Works

Federated Malay States Railways

DURING the four years of the war with Germany, the Federated Malay States Railways deferred placing even the most urgent and essential orders for locomotives and rolling stock because of the enormous demand for them by the allied governments for military transportation purposes. However, at the termination of the war these railways had so considerably expanded during that period and had so greatly increased their passenger and freight traffic that they were compelled tc secure as much additional motive power as possible with a minimum delay.

The Federated Malay States Railways own and operate over 1,000 miles of metre gauge track. The main line runs practically the length of the Malay Peninsula, connecting Bangkok and Singapore. From this main line are various other smaller branch lines for local passenger and freight service. Their motive power consists of 202 steam locomotives of various types with their tenders ; 560 coaches are used for the accommodation of passengers. The railways employ for the handling of freight, 4,154 cars ; in addition to this, they operate a marine service which consists of steamboats, tugs and ferries. This service is accommodated by the railways' own harbors, docks and wharves.

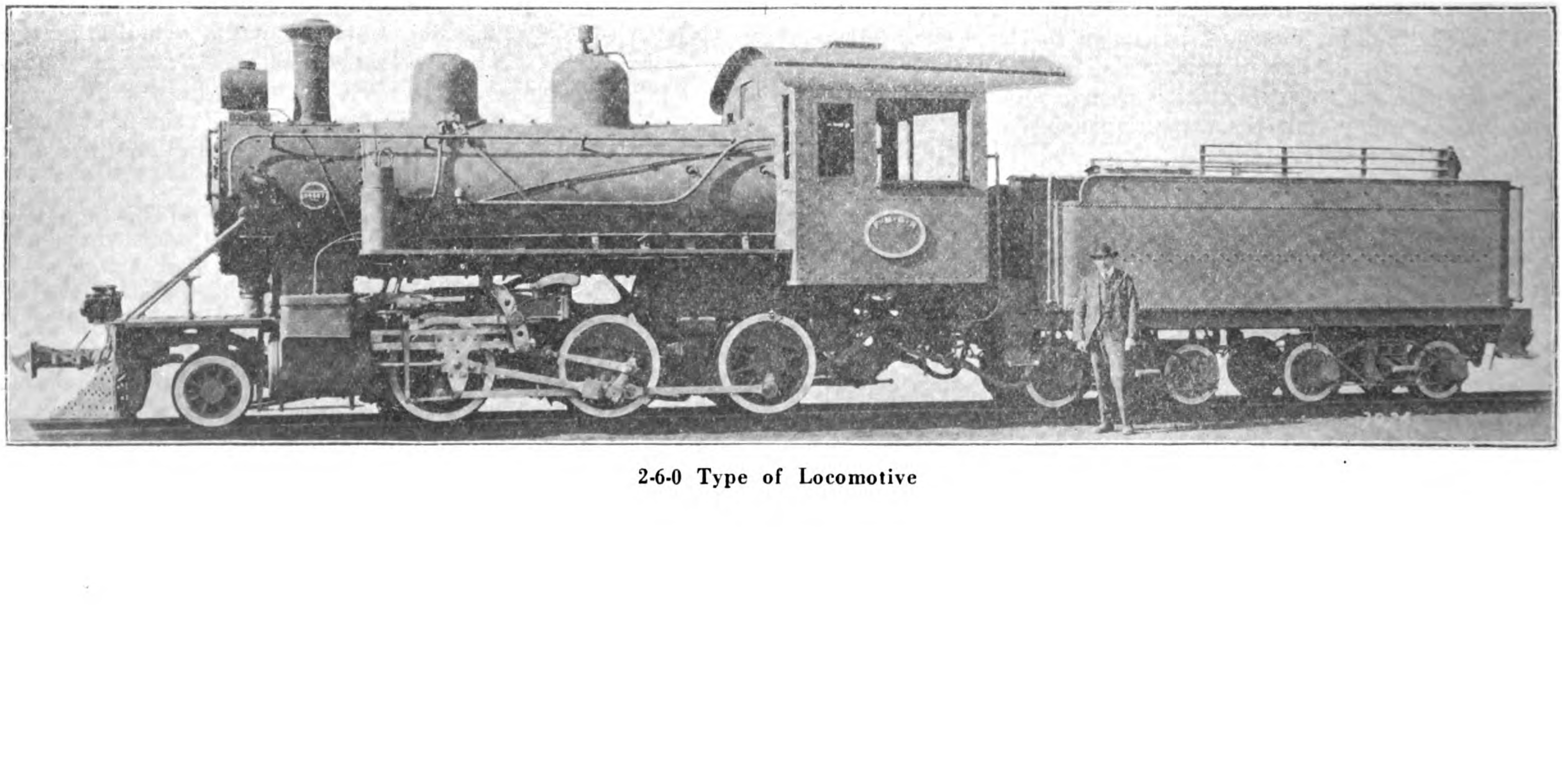
As the traffic on these railways so materially augmented during and after the war, they placed an order with The Baldwin Locomotive Works for twelve "Pacific" type locomotives for combined passenger and freight service. These engines were built in 1919 and delivered to the Federated Malay States Railways at Port Swettenham. They had 17-in. cylinders with a 24-in. stroke operated by 8-in. piston valve and actuated by Walschaert valve gear. They were equipped with American design superheaters and weighed 177,600-lbs., including the tender fully loaded.

These Baldwin engines, which were the first American locomotives to be placed in service in the Malay States, gave such satisfaction that in September, 1920, the railways supplemented their previous order by twenty more engines of two distinct types. This order consisted of ten "Mogul" (2–6–0) type locomotives for freight service and ten six-coupled side tank locomotives (0–6–0) for shunting and general freight service.

After having been inspected by a representative of Messrs. Rendel, Palmer and Tritton, London, the engines, which were built in the Philadelphia and Eddystone plants of The Baldwin Locomotive Works in fifty-eight working days, were shipped aboard the steamer *Celtic Prince* April 23, 1921, to be delivered at Port Swettenham, Malay Peninsula.

The contract for the twenty engines mentioned was given to The Baldwin Locomotive Works on account of the rapid delivery which it was possible for this Company to make and also because of the excellent service rendered by the previous orders of twelve "Pacific" type engines. Due to existing conditions in England and based on statistics obtained from recent deliveries made by English locomotive manufacturers, it would appear that the delay between receipt of an order and the actual date of delivery is of considerable length. The Baldwin Locomotive Works were able to make an almost immediate delivery of the locomotives of which the Federated Malay States were so greatly in need.

The engines are of the most up-to-date type and have open bar frames of the best steel. They are equipped with American outside equalized steam brakes applied to all the driving wheels and with automatic vacuum brakes applied to all the tender wheels with train connections at the front of the engine and at the back of the tender. These are designed to interchange and operate



2-6-0 Type of Locomotive

with the railways' standard Gresham and Craven system. Hand brakes are applied on all tender wheels. In addition to the vacuum brakes, an independent engineer's valve is mounted in the cab to operate the steam driving wheel brakes.

The engines were designed to operate on rails of 3-ft. $3\frac{3}{8}$-in. gauge, $2\frac{1}{2}$-in. gradient, and over curves of a radius of 16 degrees. Their detailed specifications are listed below :

Class 2-6-0

Gauge	$3' 3\frac{3}{8}''$
Cylinders	$14'' \times 18''$
Valves	Balanced

Boiler

Type	Straight
Diameter	52″
Thickness of barrel sheets	$\frac{1}{2}''$
Working pressure	160-lbs.
Fuel	Coal or wood

Firebox

Material	Steel
Staying	Radial
Length	$69\frac{3}{16}''$
Width	$27\frac{1}{4}''$
Depth, front	53″
,, back	$51\frac{1}{2}''$
Thickness of sheets, sides	$\frac{3}{8}''$
,, back	$\frac{5}{16}$
,, crown	$\frac{3}{8}''$
,, tube	$\frac{1}{2}''$

Water Space

Front	$3\frac{1}{2}''$
Sides	$2\frac{1}{2}''$
Back	$2\frac{1}{2}''$

Tubes

Diameter	2″
Material	Steel
Thickness	No. 12 W.G.

Heating Surface

Firebox	88 sq. ft.
Tubes	674 sq. ft.
Total	762
Number	153
Length	8′ 6″

Driving Wheels

Diameter, outside	37″
,, centre	$31\frac{1}{2}''$
Journals, main	$6'' \times 7''$
,, other	$6'' \times 7''$

Engine Truck Wheels

Diameter, front	24″
Journals	$4'' \times 6''$

Wheelbase

Driving	9′ 8″
Rigid	9′ 8″
Total engine	15′ 11″
Total engine and tender	39′ 3″

Weight

On driving wheels	52,000-lbs.
On truck, front	10,000-lbs.
Total engine	62,000-lbs.
Total engine and tender	109,000-lbs.

Tender

Wheels, number	Eight
,, diameter	24″
Journals	$3\frac{3}{4}'' \times 7''$
Tank capacity	2200 U.S. Gal.
Fuel ,,	2 cords
Service	Passenger and Freight

Class 0-6-0

Gauge	$3' 3\frac{3}{8}''$
Cylinders	$16'' \times 20''$
Valves	Balanced

Boiler

Type	Straight top
Diameter	44″
Thickness of Barrel sheet	$\frac{7}{16}''$
Working pressure	No. 160
Fuel	Soft coal

Firebox

Material	Steel
Staying	Radial
Length	$64\frac{[illegible]}{16}''$
Width	27″
Depth, front	$41\frac{3}{4}''$
,, back	$40\frac{3}{8}''$
Thickness of sheets sides	$\frac{3}{8}''$
, back	$\frac{[illegible]}{16}''$
,, crown	$\frac{3}{8}''$
, tube	$\frac{1}{2}''$

Water Space

Front	$3\frac{1}{2}''$
Sides	$2\frac{1}{2}''$
Back	$2\frac{1}{2}''$

Tubes

Diameter	2″
Material	Steel
Thickness	No. 12 W.G.
Number	103
Length	9′ 4″

Heating Surface

Firebox	59 sq. ft.
Tubes	499 sq. ft.
Total	558 sq. ft.
Grate area	12 sq. ft.

Driving Wheels

Diameter, outside	42″
,, centre	$36\frac{1}{2}''$
Journals, main	$7'' \times 7''$
,, others	$7'' \times 7''$

Wheelbase

Driving	10′ 0″
Rigid	10′ 0″
Total engine	10′ 0″

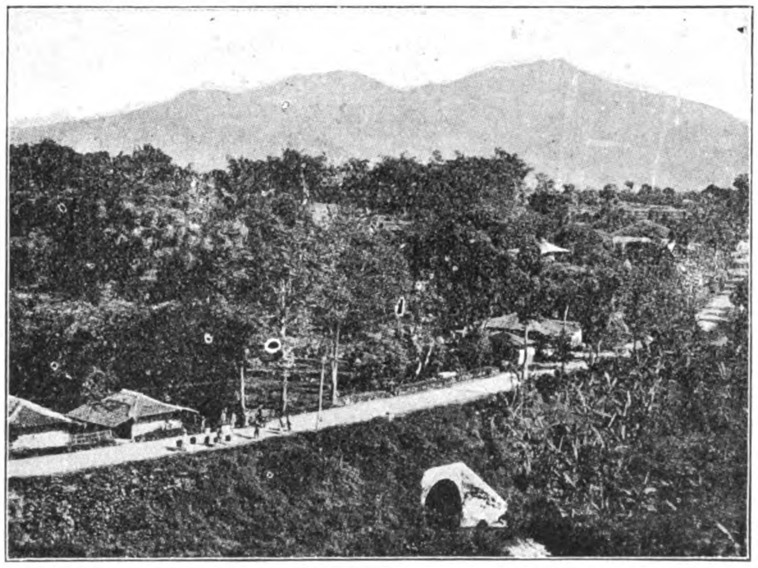
Weight

On driving wheels	78,000-lbs.
Total engine	78,000-lbs.
Tank capacity (side)	1200 U.S. gal.
Fuel ,	2 tons
Service	Switching

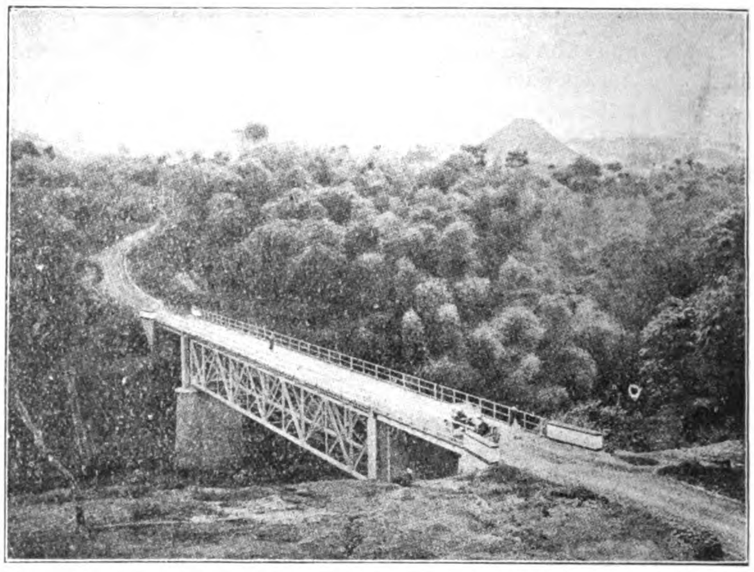
South Manchurian Railway Expenditure

The acting British consul at Dairen states that the total estimated expenditure of the South Manchuria Railway Company for the financial year 1921-22 amounts to Y. 55,960,827, made up as follows :

	Yen.
Railway	13,920,288
Vessels	1,180,498
Harbor works	4,763,794
Mining	11 004,446
Industries	1,333,142
Iron works	1,554,227
Electricity	2,485,961
Gas	1,225,172
Hotels	145,844
Local administration and building	3,322,155
Lands	4,602,958
Buildings	6,422,342
Total	51,960,827
Reserve	4,000,000



Road Over the Poentjak Pass



A Road in the Preanger Regencies

Communications in the N. E. I.

Roads, Railways, Tramways and Autobus Service

ROADS AND BRIDGES.—In Java is found a network of good and well kept roads.

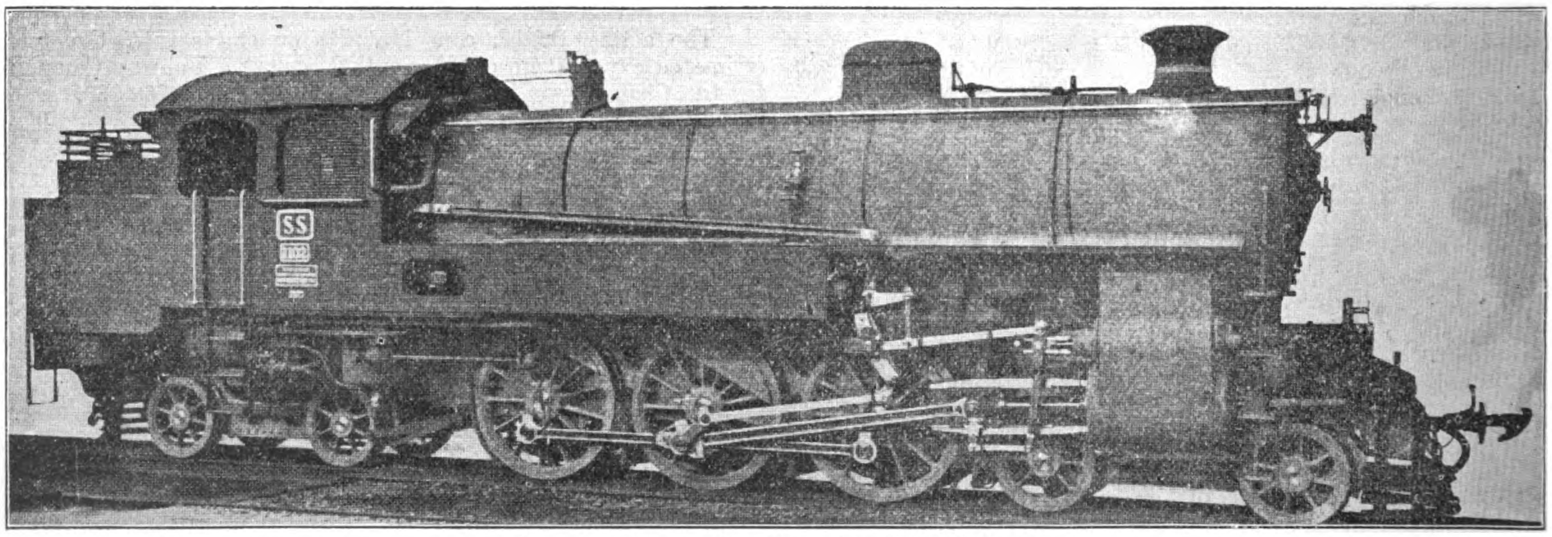
Besides the considerable amount of transport on the railroads the traffic on roads is very heavy in this rapidly developing island. Especially since the introducing of automobiles it has been continuously increasing. Improvement and extension of the present system of roads, according to the requirements of this ever-increasing transport, is a matter to which constant care is devoted by the authorities. The construction and upkeep of municipal roads was formerly entirely in the hands of the central government, but, since the decentralization of administration has been introduced, their improvement is under local management, and the carrying out of provincial road plans is more and more being entrusted to the provincial councils. It is planned in 1927 to let the provincial councils have entire charge of the plans for provincial roads.

In the meantime, however, the central government controls the carrying out of the so-called general road plan for Java. This plan includes the construction and improvement of the two main roads through the entire length of Java (the northern and the southern main road) with five cross branches. The costs are estimated at a total of *f.* 5,637.000, of which about half has already been spent on the work.

The provincial road plans fit in with this general scheme. To carry out the plans for these roads, which are supposed to be completed in ten years, and which according to a preliminary estimate will call for an expenditure of 24 million guilders, the sum of *f.* 985,-000 had been spent by the end of 1918.

The road system in the outlying possessions, from the nature of things, has not by any means attained the same extent as that in Java. Formerly construction in these parts was exclusively in the hands of the civil service officials, who carried out the work chiefly by the aid of statute labor and as a rule had not very many technical appliances at their disposal. The result was that local and provincial roads and systems were constructed, but little attention was paid to any communication between one province and another.

After the institution of a service for the inspection of roads in the outlying possessions in 1908, however, the possibility was opened there, also, to obtain a more vigorous and systematic con-



Passenger Locomotive of the Java State Railways

struction. At present this construction is being carried on more intensively in Sumatra than elsewhere. The general road plan adopted for this island and the connections proposed in the course of the last few years as a supplement to this plan, contain together a number of 54 roads, with a total length of 4,600 K.M., the construction costs of which are estimated at ± 63 million guilders. At the end of 1918, nine roads were completed and 17 were in course of construction, while at that time an amount of ± *f.* 15,630,000 had already been spent. The object of these roads is not only to establish a connection between those already existing, but also to give access to remote districts which have either been sufficiently developed to warrant the construction of a road or where more intensive cultivation may be expected when a better means of communication has been opened up.

Besides the connections already existing between Padang-Medan and Bankoolen-Palembang other transversal main roads will be constructed which will connect with roads running north and south. These will be made suitable for automobile traffic and will connect, wherever possible, with railroads and navigable rivers. Efforts are also being made to improve the means of communication by rendering the rivers more navigable. This work was also formerly entrusted to civil service officials, but now a number of these improvements are under the supervision of experts. In other parts of the outlying possessions, also, the authorities are paying more attention to the construction of roads. In Borneo where, up to the present time, the rivers have been almost exclusively the means of communication with the interior, two separate road plans are now in course of preparation, i.e., for the province south-east division of Borneo. For North Celebes (Minahassa) a plan has been made, which is already being carried out, and which aims to improve thoroughly the connections now existing to a total length of ± 500 K.M. The costs of this plan are estimated at ± 5 million guilders, of which at the end of 1918 ± *f.* 480,000 had already been spent. Among other roads in South Celebes, one is being constructed ± 126 K.M. in length, between Maros and Watampone, while the main road running along the coast is being gradually adapted for continuous speed traffic.

In the island of Bali may be mentioned the two main roads running from north to south between Singaradja and Denpasser, the construction and improvement of which have already been partly taken in hand. In the other islands, also, which have not been mentioned, new roads are constantly being constructed and the old ones improved. Besides what is being done under government control and at its expense, important work for the improvement of traffic is being carried on by various self-governing communities in the outlying possessions, some with financial support from the government. Among such works are, for instance, the Central Timor road, ± 280 K.M. in length, running from Timor Koepang to Atapoepoe on the island of Timor, and the road construction in the self-governing communities of South Celebes, Sumbawa, Sumba and Flores. Following is a review of the amounts which have been spent in the last few years for extraordinary upkeep and renewal as well as construction by the government of the Dutch East-Indies.

Construction and Renewal of Roads and Bridges.

	Java and Madura	Outlying Possessions	Total
1914	*f.* 1,147,054	*f.* 3,861,199	*f.* 5,008,253
1915	,, 1,093,143	,, 3,163,665	,, 4,256,798
1916	,, 1,402,234	,, 3,542,962	,, 4,945,196
1917	,, 1,938,014	,, 3,843,346	,, 5,781,360
1918	,, 1,738,587	,, 3,889,580	,, 5,628,167

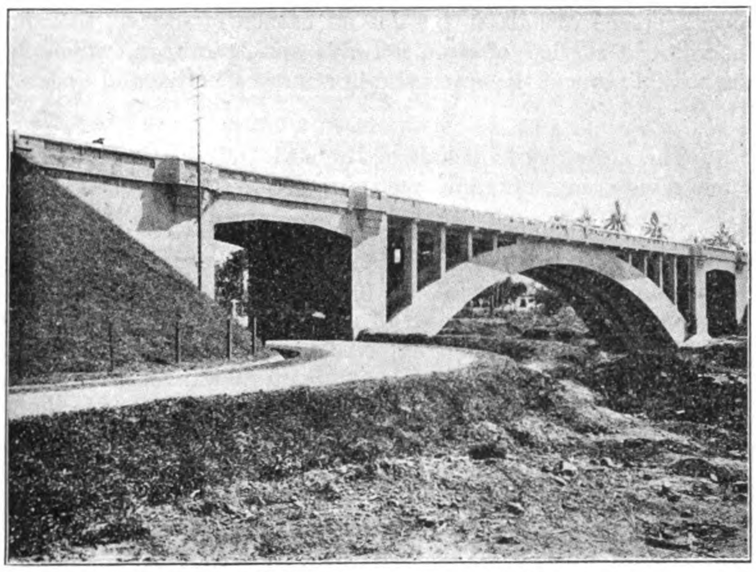
RAILWAYS AND TRAMS. AUTOMOBILE SERVICES.—The management of the government railways and trams, as well as the handling of all affairs concerning the railways and trams in general, belong to the sphere of activity of the department of government enterprises.

To handle these affairs the department has at its disposal the main offices of two separate services, i.e., (1) the service of railway and tram supervision and (2) the service of state railways and trams.

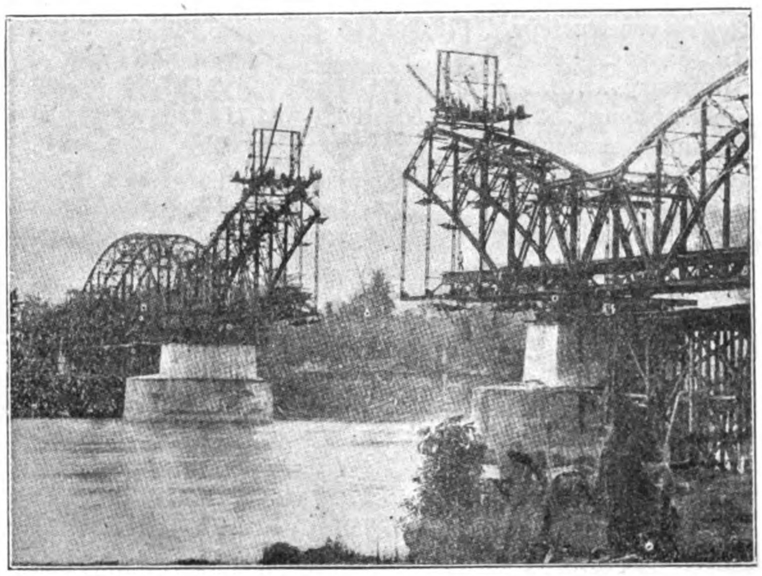
The first named service includes: (*a*) the general and daily supervision of the construction and the exploiting of all general traffic rail- and tramways, which are not being constructed or exploited by the state; (*b*) daily supervision to see that all prescriptions and regulations ordained by the authorities and all conditions of concessions are fulfilled, the control of the practising of tariffs and conditions of transportation and of the service of the rail and tramways indicated under sub (*a*) and (*c*) the general supervision of the state rail and tramways.

For the supervision mentioned under sub (*a*), (*b*) and (*c*) three inspection divisions are established: the division West and Central Java, the division East Java and Madura and the division outlying possessions. At the head of each division is a chief engineer.

At the head of the entire service of supervision is a superior official with the title: Chief Inspector of Railroads and Tramways. The service mentioned under sub 2 includes: the general management of the surveying, construction, equipment and running of the state railways and trams. The management of the service is



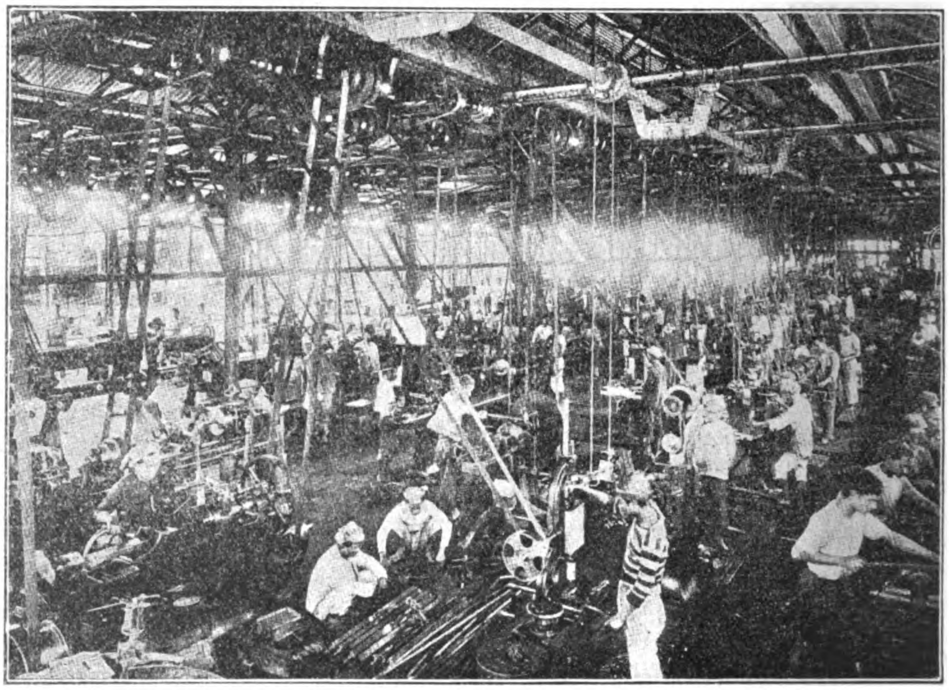
Concrete Railroad Bridge over the Tjiliwoeng



Railroad Bridge over the Serojoe River in Course of Construction

by a board of directors, consisting of three persons at the most. If the management is given to one person, he has the title of chief of the service.

I. State Railways and Tramways.—The first railway which was constructed by the state, ran from Sourabaya to Pasoeroean and Malang. The section Sourabaya-Pasoeroean, 63 K.M. long, was the first to be exploited and was opened to public traffic on May 16th, 1878. Since that date the net of state railways has been steadily increased and at the end of 1919 the following total was in exploitation:—In Java: 2,509 K.M. of standard gauge lines with a gauge of 1,067 M. and 104 K.M. of narrow gauge lines with a gauge of 0.60 M. In Sumatra: on Sumatra's West Coast 245 K.M. of standard gauge lines with a gauge as above. In South Sumatra 242 K.M. of standard gauge with a gauge as above. In Acheen and dependencies 512 K.M. of narrow gauge lines with a gauge of 0.75 M. Especially since 1906 the state railway industry has developed considerably, as clearly shown by the following figures, in which are not included those concerning the exploitation in South Sumatra and in Acheen.



Workshops of the Java State Railways

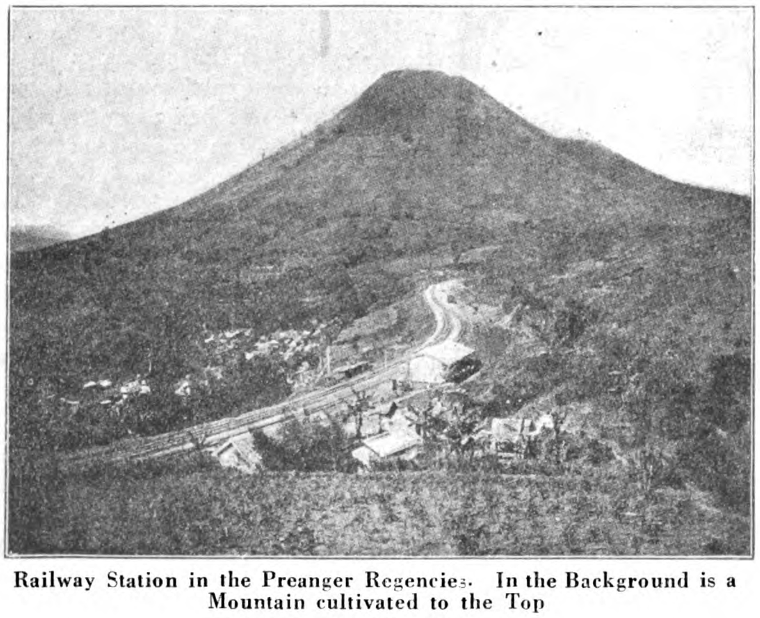
	1906	1914	1917
Cost of construction	f. 178,386,442	f. 234,495,886	f. 275,134,866
K. M. exploited (average)	2,119	2,557	2,836
Gross revenues	,, 16,506,198	,, 34,714,830	,, 44,019,653
Working expenses (including renovation, repair of extraordinary damage and written off capital)	,, 9,745,895	,, 19,543,195	,, 23,478,923
Net receipts	,, 6,760,303	,, 15,171,635	,, 20,540,730
Staff { European	1,480	2,535	3,302
Staff { Native	*	18,509	21,629
Passengers—K.M.	512,090,589	1,105,765,121	1,455,775,018
Tons—K.M.	231,611,813	489,850,374	642,291,224
Number of engines	424	513	530
,, ,, carriages	975	1,589	1,714
,, ,, wagons	5,858	10,094	11,038

* Not completely known.

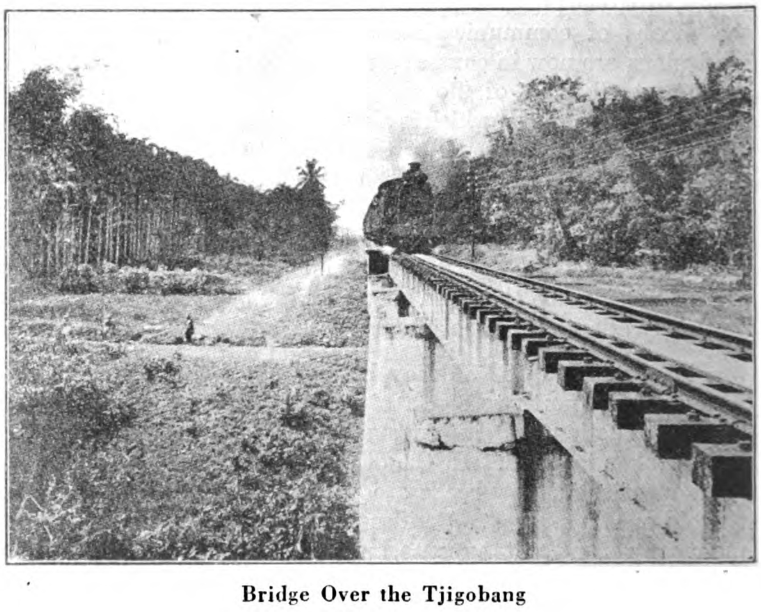
The extraordinary way in which these railways have flourished is largely due to the change in the management of the state railways and trams which was effected in 1906. In that year the management was given to a special branch of service, the above-mentioned service of state railways and tramways, which made it possible to run the enterprise in a more effective and systematic way.

The activities in behalf of the state railways and trams are now divided into nine branches of service, i.e.:

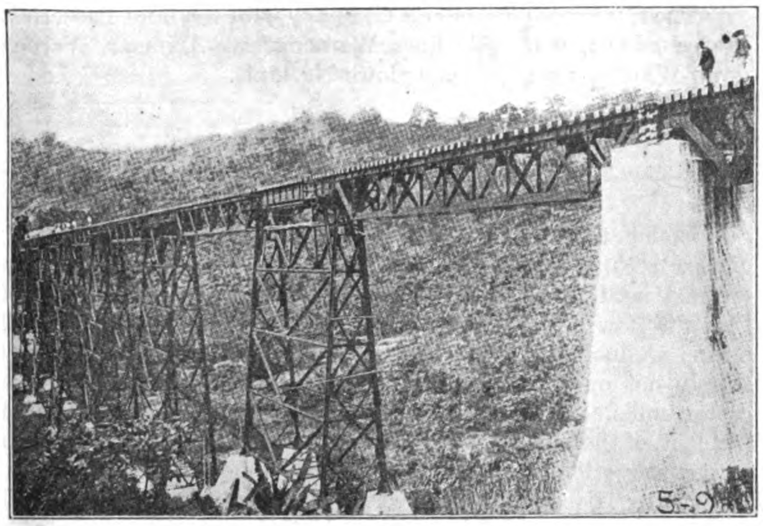
(1) the administrative service, (2) the service of roads and works, (3) the service of traction; simple lines, (4) the service of traffic and business affairs, (5) the service of tramways and automobiles, (6) the service of surveying, (7) the service of construction, (8) the service of construction and bridge building, (9) the service of extension and architectural affairs, while a technical bureau of supplies is also a part of the industry. It is the task of the service of construction and bridge building to see that all technical structures which are built fulfill the latest requirements, that they are controlled according to the latest methods of calculation, and that they are only built from materials which have proved their good quality. This service must also judge the various types of engines by which traffic may take place (in simple as well as in double traction) on certain construction works. The three



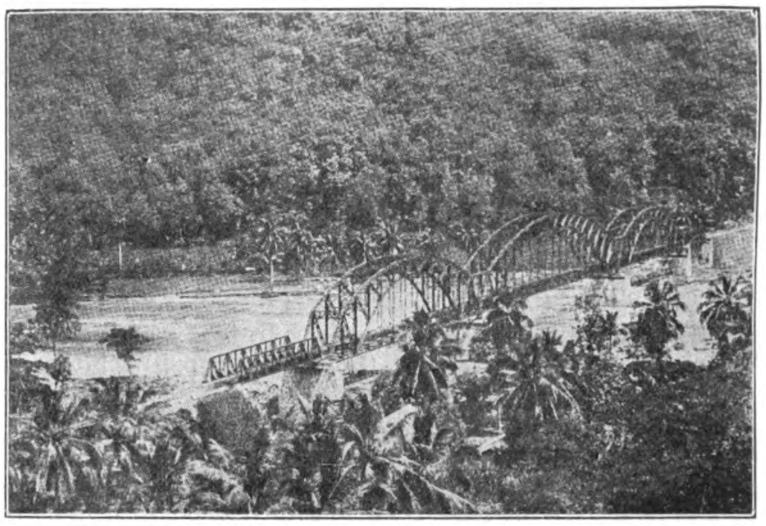
Railway Station in the Preanger Regencies. In the Background is a Mountain cultivated to the Top



Bridge Over the Tjigobang



Viaduct Over the Ravine of the Tjipamottan River



Railway Bridge Over the Serajoe River

main parts into which the activities of the state railways and trams may be divided are: (1) surveying and other preliminary work; (2) construction; (3) exploitation.

Tables next give an idea of the exploitation of the state railways and trams during the years 1910 up to and including 1918.

STANDARD-GAUGE TRACK IN JAVA

	Number of K.M. exploited	Number of Passengers carried	Tons of goods transported	Cost of construction in guilders	Gross receipts in guilders	Working expenses in guilders	Net revenues in guilders
1910	1,968	26,067,100	3,080,894	166,507,513	21,421,617	11,314,977	10,106,640
1911	1,981	29,811,460	3,194,103	169,932,205	24,147,912	11,897,903	12,250,009
1912	2,172	34,031,671	3,886,912	185,029,768	27.155,299	13,870,342	13,284,957
1913	2,228	38,747,080	4,167,640	200,665,149	29,860,672	15,347,573	14,513,099
1914	2,229	39,212,177	4,169,015	209,361,662	31,914,555	17,869,600	14,044,955
1915	2,238	39,314,692	4,727,717	214,448,660	33,357,470	17,325,192	16,032,278
1916	2,303	44,041,817	1,575,610	220,919,094	37,463,841	18,522,451	18,941,390
1917	2,108	10,116,426	1,943,372	247,738,426	40,982,248	21,663,913	19,318,335
1918	2,108	49,920,434	6,128,682	254,018,234	43,641,656	27,745,886	15,068,212

NARROW-GAUGE TRACKS IN JAVA

1910	27	371,920	24,414	250,293	64,959	28,172	36,787
1911	27	479,095	15,798	265,369	72,674	30,438	42,236
1912	43	538,548	20,274	482,268	85,710	42,195	43,515
1913	83	957,158	50,780	1,113,925	193,989	100,547	93,442
1914	83	1,117,270	57,318	1,264,464	235,330	119,027	116,303
1915	83	1,378,280	73,553	1,373,852	283,727	142,033	141,694
1916	83	1,460,837	87,660	1,431,002	317,831	142,505	175,326
1917	83	1,588,086	110,535	1,497,081	351,758	147,096	204,662
1918	83	1,569,116	101,789	1,506,997	331,366	195,536	119,281

RAILWAYS ON THE WEST COAST OF SUMATRA

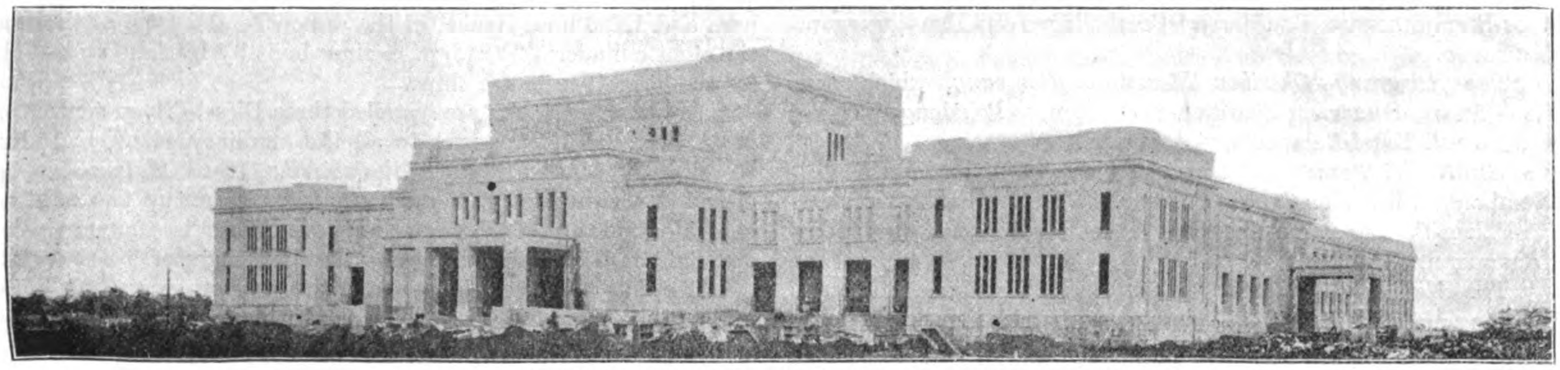
	Number of K.M. exploited	Number of passengers carried	Tons of goods transported	Cost of construction in guilders (cost of harbour and coal sheds not included)	Gross receipts in guilders	Working expenses in guilders	Net revenues in guilders
1910	245	1,035,736	496,611	22,731,572	1,846,089	1,219,367	626,722
1911	245	1,697,580	512,643	22,985,715	1,967,164	1,421.171	545,993
1912	245	2,180,023	537,763	23,298,778	2,215,810	1,547,273	668,537
1913	245	2,700,838	585,309	23,733,684	2,386,555	1,527,101	859.454
1914	245	3,001,079	639,694	23,869,760	2,564,945	1,548,566	1,016,379
1915	245	2,880,986	660,344	24,028,558	2,649,298	1,477,867	1,171.431
1916	245	3,083,828	708,839	24,386,355	2,826,297	1,626,933	1,199.364
1917	245	3,324,870	701,076	24,498,309	2,685,647	1,667,915	1,016,732
1918	245	3,487,266	710,135	25,654,012	3,412,489	1,991,250	1,358,608

As seen from the above review the gross receipts of the Java railways increased not inconsiderably in 1914. On the other hand, however, the costs of exploitation increased quite considerably. This was in connection with the increase in transportation and extension of staff and the rise in coal prices. In the following war years, also, the gross receipts increased considerably, but especially since 1917 the exploitation costs have risen so enormously that the profits and loss account diminished to a great extent. In general the increasing traffic requirements could be satisfied. Only on the railroads in and around Batavia were special difficulties encountered; to overcome them expensive works are being planned and carried out.

II. PRIVATE RAILROADS AND TRAMWAYS.—The first railroad established by private initiative is the line Semarang-Principalities, Willem I, running from Semarang via Surakarta to Djokja with a side branch from Kedoengdjati to Willem I. The concession for the construction of this railway, granted in 1862 to W. Poolman, c.s., was later transferred to the joint stock company the "*Netherlands Indian Railroad Company*" (*Nederlandsch-Indische Spoorwegmaatschappij*), the establishing of which was sanctioned by royal decree of September 17th, 1863, No. 37.

The railroad was completed May 21st, 1873.

The Netherlands Indian Railroad Company obtained a concession in 1864 for the construction of a railroad between Batavia and Buitenzorg. This line, which was completed January 31st, 1873, was purchased by the Dutch East Indian government, and changed hands November 1st, 1913. Furthermore the Company extended the net of iron roads by the construction (so far as the line under sub (*d*) is concerned by purchase of the following steamtrams:—(*a*) Djokja-Brossot-Sewoegaloer, with side branch Ngabean-Poendoeng; (*b*) Djokja-Magelang-Willem I, with side branch Setjang-Parakan; (*c*) Goendih-Sourabaya, with side branches Soemari-Grissee-Kandangan, Bodjonegoro-Djatirogo and Babat-Toeban-Djenoe. (*d*) Solo-Bojolali; (*e*) Solo-Wonogiri-Kakap. In 1918 it opened automobile services from Bringin and Toentang to Salatiga, also from Parakan to Wonosobo and Ngadiredjo.



Tandjung-Pirok Station in Course of Construction

Table next gives some data regarding the results of the working of the railway Semarang—Principalities in the period between 1914 and 1918.

	No. K.M. in use	No. of passengers	Goods carried (in tons)	Cost of construction in guilders	Gross revenue in guilders	Net revenue in guilders	Working expenses
1914	206	3,351,706	808,944	34,428,829	5,162,100	2,249,142	2,912,958
1915	210	3,264,097	840,165	35,323,810	5,065,498	2,194,849	2,870,649
1916	210	3,648,621	957,343	36,351,240	5,752,526	2,988,401	2,764,125
1917	210	4,140,088	921,625	36,661,310	5,451,392	2,349,731	3,101,661
1918	210	4,099,071	1,072,115	36,753,332	6,264,857	3,014,627	3,250,230

In the district of Deli (East Coast of Sumatra) a third railroad was constructed by private enterprise. In 1883 a concession was granted to the Deli Company (Deli Maatschappij) for the construction and exploitation of a railway, running from the anchorage on the Belawan River via Medan to Deli-Toewa with a side line to Timbanglangkat. This concession was transferred to the *Deli Railway Company (Deli Spoorweg Maatschappij)*, established at Amsterdam. The first part, 17 K.M. in length, was opened to traffic July 25th, 1886, while the line was further completed and opened up in 1887 and 1888. Since then this Company was granted various concessions for the construction of further lines, partly railways, partly tramways. In the method of construction and exploitation, however, there is no appreciable difference between the railways and trams, while in the latest revisions of concessions some tramways were renamed as railroads and vice versa. The Company is at present exploiting the following railways :—Belawan-Medan, Medan Timbang-Langkat, Medan-Perbaoengan, Perbaoengan-Tebing Tinggi-Tandjong Balei-Telok Niboeng and Tebing Tinggi-Pematang Siantar, and the following tramways :—Medan-Deli Toewa-Batoe, Kampong Baroe-Arnhemia, Loeboek Pakam-Bangoen Poerba, Timbang Langkat-Kwala, Timang Langkat-Pangkalan Brandan and Pangkalan Brandan-Besitang.

Table next gives some data regarding the working of these railroads and tramways over the period 1914—1918.

	No. K.M. in use	No of passengers	Quantity of goods carried (in tons)	Cost of construction in guilders	Gross revenue in guilders	Net revenue in guilders	Working expenses
1914	263	3,079,482	587,816	22,697,829	3,300,017	1,598,258	1,701,759
1915	361	3,064,627	800,455	25,680,188	3,433,636	1,754,708	1,678,928
1916	410	3,930,221	964,350	27,678,081	4,513,424	2,509,279	2,004,145
1917	410	4,573,450	918,515	30,285,429	5,079,356	2,805,866	2,273,490
1918	414	4,529,174	893,638	33,295,158	5,606,495	2,874,824	2,731,671

Since January 1st, 1916 the Company has run an auto-omnibus service from Medan to Kaban Djahe.

The tramway net established with private capital, extended considerably in the course of the years and at the end of 1918 reached a total length of about 2200 K.M. To the principal private tramway companies belong :

The *Semarang—Joana Steamtram Company*, which runs the following lines :—Semarang-Joana-Lassem-Pamotan-Ngandang-Djatirogo with side lines Demak-Blora, Koedoes-Petjagaan (with side line Majong-Welahan), Joana-Tajoe, Rembang-Tjepoe, Poerwadadi-Goendih and Wirosari-Kradenan.

The *East Java Steamtram Company*, which runs the lines Sourabaya-Sepandjang-Krian, Wonokromo-Koepang-Pasar-Toeri-Stadstuin-harbor and Modjokerto-Ngoro with the side line Soemengko-Dinojo.

The *Serajoedal Steamtram Company*, which runs the lines Maos-Bandjarnegara, Bandjarsari-Poerbolinggo and Bandjarnegara-Wonosobo.

The *Semarang—Cheribon Steamtram Company*, which runs the lines Semarang-Cheribon-Kadipaten, Pekalongan-Wonopringgo and Tegal-Balapoelang-Margasari.

The *Kediri Steamtram Company*, which runs the lines Kediri-Djombang with side lines Pesantren-Wates, Goerah-Kawarassan-Palem-Paper, Paree-Kepoeng, Paree-Knoto and Poeloredjo-Kandangan.

The *Malang Steamtram Company*, with the lines Singosari-Blimbing-Malang-Gedonglegi-Dampit with side lines Gedonglegi-Senggoro-Kepandjen, Blimbing-Toempang and Sedajoe-Toeren.

The *Pasoeroean Steamtram Company* with the lines Pasoeroean-Waroengdowo, with side lines Waroengdowo-Alkmaar, Waroengdowo-Winongan and Waroengdowo-Ngempit.

China and Cotton Goods

Under the heading of "Watch China" a contributor to *Barron's Financial Weekly*, a new American publication, says : "China used to be England's greatest market for cotton goods. China is now dotted over with the most up-to-date cotton mills, and is producing cotton fabrics equal to the best and sufficient to supply not only China but other former customers of European cotton mills. The cotton goods made in China cost less than 25 per cent. of those manufactured in Manchester or Fall River. What is stranger still they are even superior in quality. The careful, painstaking, docile Chinese worker, who is satisfied with a wage of two cents an hour, finishes his product to perfection. Seventeen great cotton mills were built in China last year, and ere long Chinese cotton goods will flood the markets of the world. That is the portentous industrial transformation taking place in China. There are warehouses in every seaport of China stocked to capacity with cotton goods made in England for the Chinese markets. How many tens of millions of English capital are frozen up in these goods I cannot tell, but they can never be sold for 20 per cent. of their cost. Either banks or merchants, or manufacturers, must take a loss of 80 per cent., for China will soon be invading the South American and European markets with her amazingly cheap but fine silk and cotton fabrics."

Doubt is expressed in Manchester whether the American writer is fully qualified to state that China is producing cotton goods that are superior to those manufactured in Lancashire, for during the past week shippers to China have purchased fair-sized lots of shirtings of well-known make, and, would they have done this if they could have procured a better and cheaper line in Shanghai ?

13,000-Ton Motor Ship "Malaya" for China Trade

Designed for the Far Eastern trade, the motor ship *Malaya*, which was launched some time ago, is now approaching completion, and will shortly be put into commission for the owners, the East Asiatic Co. She is of the same size as the *Afrika*, of which a description was given in *The Motor Ship* for May, 1920. These two vessels are the largest motor ships yet built in Denmark.

The *Malaya* is 445-ft. in length, with a beam of 60-ft., a moulded breadth of 42-ft. and a d.w.c. of 13,000 tons with a draft of 28-ft.

The plans have very minor modifications from those of the *Afrika*. The latter has proved an extremely satisfactory ship, and on her maiden voyage, totaling about 35,000 miles, had a daily fuel consumption averaging 14.16 tons with an average net cargo of 11,750 tons. The average speed for the whole voyage was over 11 knots.

Two six-cylinder engines, each of 2,250 i.h.p., are being installed in the *Malaya*, which has been built by Burmeister and Wain, of Copenhagen. These engines have cylinders 740 mm. bore and 1,150 mm. stroke, of the same size and type as those in the eight-cylinder 3,200 i.h.p. engines built by Harland and Wolff for the large Glen motor ships.

In the engine-room are installed three Diesel-driven generators of 65 kw., supplying power to all the auxiliary plant, including 20 electric winches. Like the *Afrika*, the *Malaya* is not provided with a funnel, the exhaust being taken up two exhaust pipes alongside one of the masts. The crew comprises four engineers and eight assistants, in addition to the chief engineer.

The double bottom is arranged to carry oil or water ballast, whilst additional oil-tank capacity is provided in the tunnel space. Accommodation is, as usual, arranged for about one dozen passengers.

Mining in Siam

AMONG the mineral resources of Siam may be mentioned rubies, sapphires, gold, tin, copper, coal, iron, zinc, lead, wolfram, antimony and molybdenum. Of these the only ones worked on a commercial scale are tin and wolfram, tin being by far the more important. The following table shows the output of the country for the last five years :—

TIN OUTPUT IN PICULS.

Monthon.	Year 126	Year 127	Year 128	Year 129	Year 130
Puket...	64,285	64,157	67,882	70,719	87,354
Patani	4,826	11,851	6,515†	6,207	8,083
Chumpawn	908	1,411	2,044	2,782	2,911
Nakon Sri Tammarat	2,419	2,768	2,842	2,547	1,279
Total	72,438	80,187	79,283	82,255	99,627

Monthon	*Year (2455) 1912-13	Year (2456) 1913-14	Year (2457) 1914-15	Year (2458) 1915-16	Year (2459) 1916-17
Puket...	99,901	100,297	98,390	130,994	130,739
Patani	6,067	8,351	7,989	15,469	10,589
Chumpawn	3,092	2,559	2,327	2,250	2,278
Nakon Sri Tammarat	1,564	2,155	2,025	2,462	3,653
Total	110,624	113,362	110,731	151,175	147,259

Monthon	Year (2460) 1917-18	Year (2461) 1918-19	Year (2462) 1919-20	Year (2463) 1920-21	Year (2464) 1921-22
Puket...	131,999	124,399	121,271		
Patani	13,520	8,560	9,106		
Chumpawn	2,364	2,620	2,900		
Nakon Sri Tammarat	5,899	12,846	6,576		
Total	153,782	148,425	139,853		

The figures given indicate piculs of metallic tin. In the case of ore being exported it is reckoned to contain 70 per cent. of the metal, this being the rate at which it is calculated for taxation purposes ; as a matter of fact the contents are probably slightly in excess of 70 per cent., probably averaging 71 per cent.

As can be seen from the table, Monthon Puket on the West coast of the Malay Peninsula is by far the most important part of the country from a mining point of view. In Monthon Puket the most important province is the island of Puket, which in the year 130 produced 53,811 piculs or about 54 per cent. of the whole of the country. The province of Renong, which in the past turned out but a small quantity of tin annually, is rapidly becoming one of the biggest producers owing to the advent of two large dredging companies.

On the East coast of the Peninsula Patani is the largest producer and the output is increasing in a satisfactory way. Both Chumpawn and Nakon Sri Tammarat are very small producers, though it is hoped that the building of the southern railway through these monthons will help to increase the tin production.

By far the most important event of the last few years has been the introduction of dredges to Siam. In November 1907 the Tongkah Harbor Tin Dredging Co. started to work their first dredge and from that time their output has steadily increased. At the present time they have no less than five dredges at work in the harbor, the two newest and largest excavating about 80,000 cubic yards per month. In December 1911 the Tongkah compound started work with one dredge on their concession which comprises the site of the old government offices and some of the adjoining land. This land has long been known to be very rich and the sum paid for the concession by the company is more than sufficient to build fine new offices ; at the same time the company should make a very handsome profit. The two other companies now operating dredges in Siam are the Siamese Tin Syndicate and the Renong Dredging Co., both of whom work in Renong, each operating one dredge at present, while the Siamese Tin Syndicate have two more on order and the Renong Dredging Co. one more, so that within a year's time there should be five dredges at work in Renong. The following table shows the total production from dredges in Siam for the last five years, *i.e.*, since dredging started. For purposes of comparison a second column is given showing the amount of tin obtained from all sources other than dredging:—

Year	Tin obtained from Dredging Piculs	Other sources Piculs
126	467	71,971
127	2,528	77,659
128	7,372	71.911
129	11,451	70,804
130	23,317	76,310
(2455) 1912-13	32,946	77,678
(2456) 1913-14	30,026	83,336
(2457) 1914-15	29.686	81,045
(2458) 1915-16	46,829	104,346
(2459) 1916-17	47,298	99,961
(2460) 1917-18	51,342	102,439
(2461) 1918-19	52,124	96,301
(2462) 1919-20	64,992	74,861

From the second column it will be seen that the output from sources other than dredging remains almost stationary, in fact the statistics for former years bear this out. The output for the year 130 is certainly higher than the previous four years, it is however not the highest on record ; the increase for this year is undoubtedly due to the very high price of tin. It is probable that the year 131 will show a considerable increase both from dredging and other sources, the price of the metal being at present far higher than it has been within the last 30 years, probably the highest it has ever been, and there is no indication of any considerable decrease in the price for the present.

In the course of tin mining in certain districts of Monthon Nakon Sri Tammarat, a black mineral was found mixed with the tin ore and of the same specific gravity so that the separation of this black mineral from the tin became a difficult operation. This mineral was known to the miners as "dead ore" and was looked

*In 127, the output from Amphur Betong, Lower Rahman, Patani, was 7,180 piculs. In 128, practically the whole of the producing territory was ceded to Great Britain.

†*Note.*—In the year 1912-1913 the Buddhist era was officially adopted in Siam, in the place of dating from the commencement of the present reigning dynasty.

upon by them as a nuisance. Some of the ore was finally taken to Singapore and it was then found to be wolfram, a mineral of considerable value though less than tin ore. The richest deposit of wolfram that has yet been found is in Amphur Klai in Nakon Sri Tammarat. As soon as the value of the mineral was known a rush took place to obtain leases, and the government decided to survey the land in plots and sell it by public auction. The money obtained from this auction was to be used for road-building purposes to assist the miners. In the year 130 about 3,000 piculs of wolfram were exported from this district and the miners must have made a good profit. At first the profits were enormous as a large quantity of the ore had been separated by the old tin-miners and left in heaps. These heaps have all been worked out and now the miners are gradually getting deeper into the rock and the profits naturally diminish. In fact if capital and knowledge are not available to work the deposit on proper lines the export from this field will soon cease.

Not far from this district lies the island Koh Samui, where a European company has spent a certain amount on prospecting and installing machinery. They do not appear to have met with great success as they have stopped operations for the present.

Small quantities of wolfram have also been mined in Puket. In fact the mineral appears to be fairly widely distributed in the Siamese portion of the Malay Peninsula.

Gold is won on a small scale, in many parts of the country, the Chinese and Siamese washing it out of the stream beds. In the past European companies with large capital have attempted to work some of the deposits, viz., at Tomoh, Bangtaphan, Wattana and Kabin. In every case the result was failure, though how far this was due to the poorness of the mines and how far to mismanagement it is difficult to determine. Undoubtedly in many cases mismanagement played an important part. On a smaller scale capital has been spent in opening mines at Muang Lomm in Petchaboon, and at Pu Kiriu in Lopburi, with equally bad results. In all the above-mentioned places small amounts of gold are still won by the Siamese and Chinese, but it can hardly be said to constitute a regular industry, as most of the people only work at gold washing in their spare time. At Tomoh, where the alluvial deposits are nearly worked out, a certain amount of rock mining is carried on by the Chinese.

An unsuccessful attempt was made by Danish capitalists some years ago to work a copper mine at Chantuk on the way to Korat, and samples of copper ore are occasionally brought in from different parts of the country to the mines department for identification. Most of these samples have been sulphides but one specimen of native copper was identified.

Since the cession of the Pailin district to the French in 1907 the gem industry has ceased to have any importance. Gems are still found near Korat and in other districts, but the total value is very small indeed.

An enterprise was started to work lead in Jalar many years ago, but nothing came of it. The machinery still lies scattered over the country, never having reached the mine. Lead occurs mixed with tin in some of the Jalar fields and causes considerable trouble to the miners, the lead occuring as carbonate and the tin as oxide, and the two are very difficult to separate owing to their having the same specific gravity. At the present time there is a prospect of a lead mine of considerable size being opened above Karnburi in Monthon Ratburi. An English engineer has examined it and advised further prospecting being done. At present a diamond drill is at work obtaining samples from depth. There is no doubt that a large body of ore exists, but the question at present is whether the quality of the ore is good enough to counterbalance the very high transport charges which will necessarily be entailed.

Coal has been known for many years past to exist in Gherbi, and a certain amount of capital has been spent during the last five or six years in examining the deposit. There is no doubt as to the quantity, but the quality is poor. The deposit is situated on tidal water, and the question of transport provides no difficulties.

Magnetic iron and titaniferous iron are very frequently brought to the mining department. Neither of them is likely to be of any value in the country. They are brought in for identification under the mistaken impression that they are wolfram, which they closely resemble.

The revenue derived from mining varies very much from year to year. By far the greater part of the revenue is obtained from the royalty imposed on all tin exported. This royalty is based on a sliding scale varying with the price of tin. With tin at $60 per picul the royalty only amounts to about 10 ticals per picul, whereas with the present abnormally high price of the metal the royalty has risen to about 26 ticals per picul. It will thus be seen what an important factor the price of tin is in estimating the amount of revenue. Not only is the royalty per picul much higher with the present high price, but the miners are naturally striving their utmost to turn out as much tin as possible. The following table shows the revenue derived from mining during the last thirteen years. For purposes of comparison the average price of tin in Singapore for the years in question is given in the adjoining column :—

Year	Average price of tin in $ per picul	Revenue. Ticals
118	60	626,046
119	62	1,239,204
120	61	746,733
121	62	1,105,849
122	63	1,082,425
123	68	1,020,866
124	75	1,210,480
125	92	1,536,532
126	71	1,095,165
127	67	826,483
128	71	918,968
129	82	1,185,823
130	95	1,900,000‡
(2455) 1912-13	107	2,416,670
(2456) 1913-14	95	1,871,514
(2457) 1914-15	(a)	1,137,628
(2458) 1915-16	88	1,839,442
(2459) 1916-17	89	2,126,273
(2460) 1917-18	122	4,277,234
(2461) 1918-19	147.84	6,454,647
(2462) 1919-20	148.24	4,307,320

(a) After the outbreak of war no prices were quoted, since, for a time, there was practically no market for tin. It is therefore not possible to give an average price.

In the early years of the table it will be noticed that the revenue does not follow the price of tin. This is due to the changes made in the rate of royalty collected during these years. In the latter years the connection between the price of the metal and the amount of revenue is very evident.

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‡ Estimated.

On the 31st of March, 1912, 50,691 *rai* of land were alienated for mining purposes. The following table gives full particulars as to distribution :—

Monthon	Muang	Leases in force, April 1, 1911-		Leases lapsed, April 1, 1911 March 31, 1912		Leases issued, April 1, 1911-March 31, 1912		Leases in force, March 31, 1912	
		No.	Area in *rai*	No.	Area in *rai*	No.	Area in *rai*	No.	Area in *rai*
Puket	Puket	340	29,607*	46	2,182	43	2,475	337	29,900*
	Renong	139	5,828†	16	207	17	969	110	6,590†
	Pangnga	57	2,787	3	131	23	1,323	77	3,979
	Takuapa	—	—	5	98	59	3,044	54	2,946
		536	38,222	70	2,618	142	7,811	578	43,415
Nakon Sri Tammarat	Nakon Sri-Tammarat	6	160	3	81	12	2,425	15	2,504
	Songkla	6	1,270	—	—	—	—	6	1,270
		12	1,430	3	81	12	2,425	21	3,774
Patani	Jalar	12	4,105‡	1	2,000	2	407	13	2,512
	Bangnara	1	50	—	—	—	—	1	50
		13	4,155	1	2,000	2	407	14	2,562
Chumpawn	Chaiya	1	110	—	—	—	—	1	110
	Langsuan	23	1,098	4	709	2	141	21	530
		24	1,208	4	709	2	143	22	040
Ratburi	Kancha-naburi	1	300	—	—	—	—	1	300
		1	300	—	—	—	—	1	300
Totals for the whole country		586	45,315	78	5,408	158	10,784	636	50,691

* Including Tongkah harbor concession of 6,955 *rai*.
† Including Ngao concession of 2,831 *rai*.
‡ Including Tamtalu concession of 2,000 *rai*.

The Copra Trade in the Dutch East Indies

COPRA is an article that is produced in the Dutch East Indies by the natives ; and while there are large areas under cultivation, the unit of holdings is very small, says American Trade Commissioner John A. Fowler. This necessitates a buying organization that covers a very large area. The field may be divided roughly into two general groups—Java and Madura and the outer possessions. The products of Java and Madura enter the world markets thiough Soerabaya and Batavia. There are a large number of oil mills in the East Indies, the largest of which is the Oliefabuieken Insuldie. These mills are located at points where it is easiest to get a supply of copra. They have developed organizations to cover their fields intensively.

The outer possessions find their market at Soerabaya and Makassar. The outer possessions include South and East Borneo, Celebes, the Molukkas, New Guinea, and the smaller Sunda Islands. Steamship routes of the Koninklijke Paketvaart Maatscjappij radiate primarily from Soerabaya to many of these ports, and a secondary system radiates from Makassar eastward. South and East Borneo and the smaller Sunda Islands are directly tributary to Soerabaya, while the island of Celebes, the island of Halmahera, Cerem, Aroe Islands, and New Guinea and served from Makassar.

Plan to Control Supplies

The European markets of Amsterdam, Rotterdam and London in pre-war years had a practical monopoly on the copra of this part of the world, the oil mills of the Orient not having developed to any great proportions at that time. A plan to control the product of the territory in the interests of European markets has been developing since the early part of 1919. An Amsterdam organization, which is popularly known in the O·ient as the Jurgens interests, is reported to have made a combination of Dutch, German, French and English mills. They have built a large mill in Makassar and one at Padang. Their agents in Makassar are the principal exporters of copra from that port.

Boring for Oil in British Malaya

THE presence of profitable oil-fields in Burmah, Sumatra and Borneo has frequently prompted the query whether oil might be found also in British Malaya, which occupies a central position in these oil-bearing regions. Hopes were aroused that this query might be answered in the affirmative when in 1917 a report was made that oil had been discovered on the Erik Estate, neai the mouth of the Bernam River, the boundary of the States of Perak and Selangor.

Trustworthy evidence established the fact that very small quantities of oil had been obtained from the surface of a pool on more than one occasion ; but when the government geologist (Mr. J. B. Scrivenor) visited the estate there was no sign of oil-or of any likelihood of mineral oil being found in commercial quantities. The estate is on an extensive recent alluvium of the Bernam River. The nearest exposures of older deposits are the quartzite and shale of Changkat Jong, and similar rocks in exposures on the Bernam River mapped by Dr. W. R. Jones, and the granite of the Pulo Sembilan. It was reported by the geologist in his report for 1919 that the owners of the estate proposed to sink a bore through the alluvium in the hope of finding a patch of oil-bearing rock.

In his report for the past year, Mr. Scrivener states that a deep bore was started on the Erik Estate, and that specimens from the bore are being sent to the geological department. No other details are forthcoming, but it would be welcome news if further investigations were to reveal the existence of another oil-field in British territory So far, however, official reports are not encouraging as to the prospects of the discovery of oil-bearing strata in the peninsula.

FAR EASTERN IRON AND STEEL

A NEW STEEL AND IRON WORKS UNDER ORGANIZATION, SHANGHAI.—The Wu-Shun Steel and Iron Works of Shanghai, capitalized at Tls. 2,000,000, is being organized in Shanghai by Messrs. Loh Pei-hung, Tai Li-kung, Loh Chin-pao, Loh Pai-tsi and several others.

* * *

ANGLO-CHINESE IRON WORKS IN CHINWANGTAO.—An Anglo-Chinese Iron Works, capitalized at $15,000,000, equally subscribed by Chinese and British interests, has been registered with the Chinese authorities and opened to business. According to report, it can produce a daily average output of 200 tons of iron and its capital is to be increased to $50,000,000 from time to time.

* * *

A NEW STEEL REFINING WORKS.—A Steel Refining Works at the Yien Poo Tan, Pootung, is to be constructed by Mr. Lu, a Shanghai merchant, as soon as he has raised the necessary capital.

* * *

GOVERNMENT WORKS CUT STEEL PRICES: JAPAN.—Governor T. Shirani, of the Government Steel Works, at Edamitsu, announced recently that an all-round reduction in prices for all sorts of steel and iron by Y.10.30, was effective immediately.

The reduction was necessitated by the steep decline of foreign steel and iron prices and will also serve to check the import of foreign stock. The steel works is contemplating disposing of the present stock amounting to 108,000 tons as quickly as possible.

* * *

IRON AND STEEL INDUSTRY IN JAPAN.—Rather a despondent view of the iron and steel industry in Japan is taken by German industrial interests as to a natural basis for an extension of the Japanese iron and steel industry; whilst Japan has at her disposal considerable quantities of coal, only a portion can be used for industrial purposes, and will therefore have to be supplemented by imports, chiefly from China. The country, however, lacks large deposits of iron ore, and China again will have to be the most important source. The extensive ore deposits in the Philippines, said to contain about 500,000,000 tons, will no doubt receive the attention of Japanese interests. Special experiments made in Japan for producing steel from volcanic ironsand were mentioned some time ago. The trials were begun in the autumn of 1920, and are said to have yielded good results, but the process has so far proved too costly for commercial purposes.

The situation is discussed in a recent article in "Stahl und Eisen" which summarises the causes which have led to a set-back in the industry in Japan. Chief amongst such influences, of course, is the reaction from the rapid development during the war. The industry was then organized for immediate profit and has lacked stability. European and American products are superior and requirements are being satisfied from these sources as conditions again become normal. The days of excessively cheap labor in Japan are past, to this difficulty has to be added a heavy fall in the prices of iron and steel. Pig-iron, which was quoted at Y.300 (say £30 at par) at the beginning of 1920, now sells at Y.80 (say £8) and is said to have even been offered at Y.62 (£6 4s.)). On the other hand, the costs of production are stated to be from Y.100 to Y.120 (£10 to £12), and only the large State steel plant at Yawata is said to be able to produce at Y.90 (£9) the ton.

Japan exceeded the limits of sound development in shipbuilding by building for speculation. This, of course, directly affected the iron and steel industry. Little assistance again has been forthcoming from the railway administration, which is postponing important works during present high cost of labor and material. Some hope of relief may be afforded by the considerable expenditure provided for in the last Budget for the Army and Navy, for which Y.738,281,000 (say £73,830,000) have been set aside out of a total of Y.1,562,000,000 (£156,250,000). The measures now under consideration for improving the position are based on the recognition of the fact that, in all endeavors to solve the problem, a close connexion must first be established between the iron and steel industry and shipping or shipbuilding. The recommendations made some time back by the financial and economic committee appointed by the government include the amalgamation of all groups of works concerned, the introduction of protective duties, the importation of shipbuilding materials free of duty, and the subsidising of home-made steel for shipbuilding purposes. The suggestions even go so far as to advocate the creation of a national shipping trust with government aid, headed by the Nippon Yusen Kaisha, the largest shipping concern in the country.

The combining of the industrial works so frequently referred to in these pages meets with difficulties which again are due to the rapid development in recent years. The size and organization of the different undertakings are too varied and the financial basis shows too wide differences. Nevertheless, the necessity for such a combination has so far been recognized by a special committee entrusted with an examination of the situation, who have recommended the establishment of a community of interests between the leading works in such a form as would practically create a steel trust. A financial participation of the State seems to have been taken into consideration in this connection.

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COST OF IRON AND STEEL PRODUCTION IN CHINA.—The iron ore, of which from fifteen to twenty thousand tons were required every month when three of the four furnaces were under operation in 1919 (perhaps another eight or nine thousand tons would be needed for the fourth furnace) comes from the company's own mines at Tayeh. The cost of its production at Tayeh was below $2.80 per ton (in 1919), but the cost of transportation per ton from Tayeh to Hanyang was 85 cents which, together with other expenses, brought the cost up to about $4 per ton at the Hanyang furnaces. This cost is now much lowered by smelting the ore in the new blast furnaces at Tayeh, but at the same time a greater allowance must be made for coke which has to be transported from Pinghsiang to Hanyang and thence again to Tayeh. As nearly equal quantities of coke and ore are used in the furnaces, the saving effected in transportation is not of much significance.

OTHER RAW MATERIALS.—Limestone also comes mainly from Tayeh. The cost per ton at the Hanyang furnaces varied in 1919 between $2.32 and $3.81. These figures include all transportation and overhead charges. Manganese comes from the company's mines at Changlai and Yangshin. Those two items amounted in 1919 to three or four per cent. of the total cost. The following figures for the first seven months of 1919 will show the comparative costs of the different kinds of raw materials :—

Month.		Coke. %	Iron Ore %	Native White Iron. %	Manganese, Limestone, etc. %	Total for Raw Materials %
Jan. 1919	...	45.7	13.8	13.5	3.9	76.9
Feb. ..	...	48.1	14.7	5.2	4.7	72.7
Mar. ..	...	47.0	12.2	9.7	4.7	73.6
Apr. ..	...	55.4	14.1	1.9	4.2	75.6
May ..	...	51.8	13.4	8.1	4.3	77.6
June ..	...	52.5	13.4	7.9	4.7	78.5
July ..	...	53.7	12.7	8.4	5.0	79.8
Average	...	50.6	13.5 (minus)	7.8 (plus)	4.5	76.4 (minus)

The above refers to raw materials. The next group of items of cost concerns direct wages. This includes not only the wages of laborers working at the furnaces, but also of those working at the blowing and pumping plants, both of which are essential adjuncts to the furnaces. working at the furnaces, but also of those working at the blowing and pumping plants, both of which are essential adjuncts to the furnaces. There are in the Hanyang Works blowing and pumping plants for each set of two furnaces and the wages of the laborers working at these plants are therefore divided into two equal parts, one part being assigned to each furnace. For convenience' sake the laborers working at the furnaces are also divided into four groups. The first group works at the stock house where raw materials are fed into the furnace; the second watches the smelting process through which the materials pass; the third attends to the casting hall where the molten iron flows into the moulds; and the last group looks after the devices by which the slag is disposed of.

The wages of the laborer differs not so much with the group in which he works, as with the grade of labor to which he belongs. In general the laborers are divided into four grades; namely, the foremen, the mechanics, the regular laborers and the helpers who are paid by the day. The salaries of the foremen may be in some cases as high as one hundred dollars a month; the mechanics receive about twenty dollars; the regular laborers from 8,500 to 9,000 cash (at the present rate of exchange between silver and copper, about $7) and the helpers get only 200 cash a day, (about 15 cents). In some cases contract labor is also employed.

The laborers work in two shifts, night and day. In each shift about two foremen, three mechanics, and fifty laborers work at each of the small furnaces, and about twice as many laborers work at the No. 3 furnace. As the wages are very low, the total cost in direct labor for all three furnaces totals only from 0.8 to 1.4 per cent., of the total cost of iron production. The advantage of cheap labor is phenomenal, and if the iron industry does not prosper, and if the cost of iron does not come below that in other countries, the blame cannot be laid on labor. It cannot even be said that the latter is cheap but inefficient, because inefficient labor would combine a low rate per man with a high per cent. cost per unit of product, which condition does not obtain in the present case.

(To be Continued).

Engineering, Financial, Industrial and Commercial News

AGRICULTURAL

Sugar Cane Cultivation in Chekiang.—A number of overseas Chinese are attempting to introduce Formosan sugar cane into the province of Chekiang and its surrounding territories and have established a number of experimental farms. The seedings imported from Formosa are said to be growing well.

Agricultural Depot, Harbin.—An agricultural depôt covering an area of 5,000,000 square feet is being established with a capital of $1,000,000 on west of Sungkiang-chen, Harbin.

Growing Demand for Harvesters in Manchuria.—It is reported that there is an opportunity in Manchuria for the introduction of bean harvesters and thrashers of from 4 to 8 horse-power, suitable for the cultivation of the soya bean, the principal export crop of the district. There is also a market for thrashing machines with cylinders not to exceed 28 inches, and of about 8 horse-power, mounted on wheels, and also for small mills to husk rice, kaffir corn, millet and other grains, according to an article in *Finance and Commerce*.

AUTOS

Changsha-Hsiangdai Military Road to Run Auto Service.—Mr. Chen Tze, gentry of Hsiangdai, Hunan, has entered into an agreement with the Hunan provincial authorities for renting the newly built Changsha-Hsiangdai military road for running automobiles. A company named Loong Hsiang has been established with a capital of $100,000 to undertake the enterprise and ten auto buses capable of accommodating 32 passengers each at a total cost of about $70,000 have been ordered from Shanghai.

British Cars for Japan.—Several of the principal motor manufacturers have of late received numerous enquiries from Japan in regard to the importation of British cars into that country. Hitherto the bulk of the trade has been in American hands, but there is a growing demand for substantially built vehicles having the quality of finish which has always characterized the British car. Outside the principal cities Japanese roads are not of the best, and it is essential that to make good out there a car must be an uncommonly good hill-climber. A member of the British trade who has for some time past been making a study of the Japanese market reports that motor-tractors are also likely to find a good sale, as there is a call for them in many of the sugar-producing areas.—*B. C. C. J.*

AVIATION

The Peking-Kansu Air-Line.—With reference to the air-line between Peking and Kansu, it has been decided that a landing field will be established respectively at Lanchow and Ping-liang in the province of Kansu. The stations will have a length of 300 feet and a width 100 feet and are to be completed in November, when the air-service is expected to begin. The governor of Kansu has been instructed by the ministry of war to that effect.

Oversea Aerial Flight: Japan.—The first oversea long distance aerial flight is to be held between November 10 and 20 under the auspices of the Imperial Aeronautical Association, Tokyo. The proposed route is to start at Liushutun opposite Dairen across the Dairen Bay and to pass over Seoul, Taikyu and Fusan, stopping for the night at Seoul. Then, the aeronauts will land on Okinoshima in the channel and will choose either Tachiarai (Fukuoka), Kurume or Kumamoto for the destination. The distance to be covered is 1,700 kilometres and the time required is put at 8 hours. The prizes offered are Y.30,000, Y.25,000 and Y.15,000 for the 1st, 2nd and 3rd prizes. Judges are to be stationed at points on the proposed route.

New Aeroplanes, Japan.—Large army aeroplanes, 25 in number, ordered from France, have arrived and have been transferred to the Japanese army aerodrome at Tokorozawa. After a trial flight at Tokorozawa the newly-imported craft will be distributed to the various army divisions. These aeroplanes are for the purpose of dropping bombs and carrying war supplies. They will be capable of carrying 15 men and of continuous flights of 16 hours.

Private Air Service for Szechuan.—Several aviators in Szechuan have recently gathered a capital of $600,000 for the establishment of an aerial transportation service by airplanes.

According to the plans four large seaplanes, each having a capacity of carrying 30 passengers and cargoes are to be purchased for the Ichang-Chungking service and several smaller ones for the service in the interior, besides a number of motor-boats. A petition has been submitted to the ministry of communications and the aeronautic department who have been requested to grant the registration.

The aeronautic department, considering that the name of the said Company, the Chuan-Kiang Aerial Company, would confuse the name of the aeronautic department, has replied ordering the promoters to change its name first.

Some time ago a French merchant purchased a seaplane for preparing to start a commercial service between Szechuan and the Yangtze. Owing to the importance attached to it, the government has flatly refused to give permission to the French merchant.

BRIDGES

To Re-Construct Bridges Along Peking-Mukden Railway.—In order to avoid possible breakage of bridges at Liu-ho-kew, Pei-gee-pao and Singming during the rainy season, General Chang Tso-lin has proposed to construct strong iron bridges between the section from Mukden to Shanhaikwan in place of the old ones.

Belgians Given Yellow River Bridge to Build.—The tender examination committee appointed by the ministry of communications has awarded the contract for the Yellow River railway bridge to the Societe Belge pour l'Exploitation Industrielle, which estimates the cost at $10,500,000.

Prizes of $80,000 and $25,000 respectively, are awarded to the Compagnie Generale d'Extreme Orient and another French company for the second and third-best tenders.

BUILDINGS

New Building for Chinese Post Office.—The Chinese postal administration invites tenders in competition for the election of a two-storeyed office building at the directorate-general of posts, in the ministry of communications, Hsi Chang An Chieh, Peking.

Plans, specifications and forms of tender may be obtained on application to the chief secretary, directorate-general of posts, Peking.

May Build Y.500,000 Museum in Uyeno.—A Y.500,000 museum, to be known as the Citizens' Museum and to be planned as a place for materials scientific, historical and botanical from all parts of the world, will be built in Uyeno Park within the next few years if plans now being considered by municipal authorities there are carried out. The proposal to erect such a building is said to have come at the instance of Mayor Baron Goto.

New Building for Soochow Telephone Exchange.—The new building for Soochow telephone exchange is being built at Lu-chu-fong-hong, Soochow. The construction calls for an expenditure of more than $70,000 and the work is to be completed in ten months.

Chinkiang to Build Large Storehouse.—As 15 locomotives and 200 forty-ton freight cars have been lately added to the Shanghai-Nanking Railway's rolling stock, the storehouses along the line will be consequently extended so as to be able to hold more goods. The station master at Chinkiang has received instructions to that effect from the traffic manager of the above-mentioned railway, and the old warehouse there will be enlarged if there is any spare space around it.

COMMERCIAL

Coal Tar Pitch for Briquettes.—Suppliers of coal tar pitch for the above purpose and enquiring for consumers of the above products.

Mr. E. S. Little, Australian trade commissioner in China, will be glad to answer any enquiries on the subject.

A Chinese Bazaar.—Mr. Wu Ting-seng, one of the directors of the Nanyang Bros. Tobacco Co., Ld., and several other prominent Chinese merchants have established the Shanghai Bazaar, Ld., in Shanghai. The bazaar will be capitalized with $800,000 in shares of $10 each. One quarter of the authorized capital will be paid up.

Glass for Manchuria.—The Japanese Consul at Kirin has called the attention of Japanese glass manufacturers, in his cable report to the Japanese foreign office, to the fact that strong competition is possible in North Manchuria among Japanese, American and Belgian glass manufacturers. American and Belgian cargoes have already come into the North Manchurian market in increasing numbers, according to the report. The building industry in and around Kirin presents much depression following the general hard times since last year. Glass is in less demand, but fair sales are maintained. In the retail trade Japanese-made "Kuro Hishi" is quoted at and around Y.22 per boy although the ruling prices are roughly a decline of 4 per cent. as compared with the early part of last year, when business was good.

Need for Extension of American Trade in Swatow.—There are no American general importing and exporting firms in Swatow, and exports from this district are chiefly to the Straits Settlements, Siam and French Indo-China. These exports consist mainly of food products and household articles for the use of the Chinese communities in those countries. Until there are American firms in Swatow to handle and develop trade along lines which could be profitably exported to the United States, Consul M. S. Myers believes that only increases in American business can be expected. Personal contact with the market is more essential in China than in most other countries, not only on account of its peculiarities which must be studied and catered to but on account of the lack of knowledge on the part of Chinese merchants of the requirements of foreign trade and to their lack of qualifications for handling same. Following are the chief articles exported to western countries, most of these being for manufacturing purposes:—Drawn work, crochet and filet laces, groundnut oil, camphor, feathers, jute fiber, hides and skins (chiefly buffalo), rapeseed, wolfram ore and bismuth. There are large deposits of lead, silver, manganese, coal (inferior grade), iron, wolfram and bismuth in this district. There are no factories of any importance. Since the climatic conditions of Swatow are particularly favorable for the manufacture of cotton piece goods, Consul Myers considers the question of locating in this large market worthy of investigation.—*Commerce Reports.*

German Trade Increasing in Manchuria.—In their effort to recover the lost markets in the Orient the Germans are offering new inducements, states the *Manchuria Daily News.* The period of credit allowed to buyers has been further extended by several months and goods of excellent quality are offered at very low rates. As a result German goods are becoming popular. In south Manchuria German wares are increasing, although still in indifferent quantity, but in north Manchuria, especially about Harbin, the tendency to buy German products is becoming pronounced. Stocks of dyestuffs, paints and varnishes, precious metals, electro-plated ware, gold and silver powder, hardware, etc., are arriving in Harbin and the demand for these German manufactures has been particularly brisk.

Big Trade Combine for South Seas.—The establishment of the South Seas Trade Trust and Guaranty Union, Ltd., was consummated yesterday (Thursday) under the auspices of the Nichinan Trading Company, the Morinaga Confectionery, the Dai Nippon Beer Brewery, the Mitatsuchi Rubber Company, the South Seas Trading Company, the Nippon Yusen Kaisha, the Osaka Shosen Kaisha and the South Seas Mail Steamship Company, all interested more or less in the Japan-South Seas trade.

The Union is capitalized at one million yen, a quarter of which had already been paid into the treasury. The paid-up capital will be made a fixed deposit, for which the bank will accommodate capital to the amount of one million yen.

The object of the establishment of the union is the recovery of Japan's trade in the South Seas, which was shaken up by the economic depression, to its antebellum prosperity.

Fukienese Organizing a Native Products Corporation.—Some Fukienese emigrants at Nanyang Archipelago are organizing a native products corporation capitalized at $1,500,000 with the purpose of introducing Chinese products into foreign markets. The corporation will have its domestic head office in Amoy and foreign one in Manila with branch offices at Foochow, Chienchow, Chongchow and various principal ports in the Philippine Islands.

A Sea-Food Company Being Organized.—Plans are on foot by a Chinese capitalist at Shanghai to establish a marine delicacy products company at some suitable place with branches along the coast. Some experts have been sent to the maritime provinces to select suitable places as a site for this purpose.

DEVELOPMENT

Latest Report of New Corporations Registered.—According to report, the following corporations have been registered with the ministry of agriculture and commerce:—

Yue Chong Flour Mill, Kirin.
Hua An Forestry Co., Mukden.
The Central Trading Corporation, Peking.
Yung Tai Wu Tobacco Co., Shanghai.
Lu-cheng Straw Hat Co., Ltd., Shansi.
Kwan Sui Electric Light Plant, Kwan-sui, Suiyuan.
Woo Foong Co., Ltd., Honan.
Tsing-chang Matches Factory, Shansi.
Tsing Foong Flour Mill, Shansi.
Hua Ching Flour Mill, Tsinan.

New Company to Facilitate Communications. Yunnanfu.—Kweng-Yu Navigation and Autobus Service Co., Ltd., is being established at Yunnanfu with a capital of $1,000,000 in 100,000 shares of $10 each. The object of the new organization is to improve transport system and facilitate communications by running steam launches in the rivers and automobiles on land. At Kweng-ming, Hai-kow, Chen-kung, Tsin-ning and Kweng-yang respectively, a jetty will be built as stations for the launches to allow passengers to board or leave, while autobus service will be operated between Kweng-yang and Yu-chee. It is reported that some local officials are participating in the enterprise.

South Manchuria Railway Co. Enterprises.—The estimates for the fresh enterprises of the South Manchuria Railway Co. for the new fiscal year (1921) have been sanctioned by the central government, states an issue of the *Manchuria Daily News.* In drafting the estimates such enterprises of urgent nature only as have been continued from the preceding fiscal year have been included in the program, because of the present economic depression. Since there is said to be a sum of about Y. 20,000,000 of enterprise fund available from the accounts for the fiscal year 1920, the actual total available for the current fiscal year will reach Y. 75,960,000. The main features of the new estimates are: Railway improvements, Y. 13,920,000; shipping, Y. 1,180,000; harbor works, Y. 4,763,000; mining equipments, Y. 1,004,000; industrial enterprises, Y. 1,338,000; iron and steel works, Y. 1,555,000; electricity and gas works, Y.2,485,000, sundry enterprises Y. 1,225,000; hotels, Y. 145,000; local administration, Y. 3,322,000; city planning, 4,602,000; buildings, Y. 6,422,000; reserve fund, Y. 4,000,000.—*Commerce Reports.*

Latest Report of New Corporations Established.—The following corporations have recently been registered with the ministry of agriculture and commerce:—

Pai Hwei Bag Making Co., Hweiying, Kiangsu.
Tung Yih Banking Corporation, Kiangsi.
Yee Cheng & Co., Kwei-yung, Kiangsu.

A New Sino-Japanese Enterprise in Mongolia.—It is reported that an agreement was entered into on July 18, 1921, between Marshall Chang Tsoling, inspector general of Manchuria, and some Japanese interests for the establishment of the Shun Fah Corporation with the purpose of bringing desert Mongolia into modern cultivation under Sino-Japanese management. General Chang has subscribed a lot of land lying at Chen-char-dung, which is said to be very productive and fertile, at a value of Y.4,000,000 and the Japanese capitalists have subscribed an equal amount in cash, making a total capital of Y.8,000,000. This is the first Sino-Japanese enterprise ever undertaken in Mongolia.

ELECTRICITY

An Electric Light Co. Under Organization at Tunghsien, Chili.—The Tseng Hwa Electric Light Co. is being organized by Mr. Cheng Yao Yung at Tung-hsien, Chili.

Electric Flour Grinding Machine Invented.—Mr. Yao Sher-ngai, a native of Chang-ping Hsien, Chili, has invented a flour grinding machine driven by electric power, having a producing capacity equivalent to ten workmen. Two model machines have been submitted to the ministry of agriculture and commerce with the request of granting a patent.

An Electric Plant Established, Hupeh.—An electric light plant has been established by Mr. Wang Yu-wen at Lao-wu-kow in Kwang-hua Hsien, Hupeh.

Chinese Electrical Industry.—Foochow Chinese merchants are interested in a scheme for a hydro-electric plant to develop power from the Min river. It is reported that American capitalists have been approached in connection with the proposed venture.

A number of local Chinese are contemplating the opening of an electrical goods factory, with branches at Shanghai, Soochow and Wusih. The Chinese press states that the promoters are joining hands with the German firm of Siemens for the manufacture of newly-invented goods.

Electric Plant Under Organization, Fukien.—It is reported that an electrical plant is being established at Nan-yar-kow, Fukien, by some local capitalists, and Messrs. Ling Tze-zan and Chen Kwei-sze have been given the power of attorney to purchase machinery from Shanghai.

Peking Electrical Development.—The Peking government is reported to be taking a serious interest in the pressing need of both Peking and Tientsin for further electrical developments. Does this mean another loan!

British India Electrical Development.—Electrification of the suburban railways within twenty-five miles of Calcutta is considered.

The Punjab Hydro-electric and Industries Association, with headquarters at Delhi, proposes to develop electrical power on four canal falls to increase the present supply at Simla. Negotiations are proceeding for the installation of electricity at Rawalpindi, Multan, Lyallpur, Jullunder, Sialkot and Gujranwala.

An Electric Light Plant Under Organization.—Mr. Hsu Tze-tsin is planning to organize an electric light plant at Sun-Fong-Chen, a leading town in Wen-an-hsien, Chihli. Regulations governing the organization of the new company have been submitted to the authorities concerned for permission.

To Supply Mukden-Fusan Industries with New Electric Power.—Arrangements have been made by the representatives of the South Manchurian Railway and other Japanese interests in Manchuria to run a power cable between Mukden and Fusan to supply industries, mines and some motive power in the railroad zone and the two terminal cities. A Sino-Japanese corporation will be formed to manufacture and distribute the power which is not seriously needed for various business enterprises in the rail zone. The Chinese will have one advisor and one director, all other officials and employees in managerial capacities being Japanese, Chinese will get 40 per cent. of the of the net profit.

Electric Enterprises in Japan.—Investigations made by the electric bureau in the department of communications show that at the end of April of this year, the number of companies undertaking electric operations throughout this country totalled 821, with an aggregate capital Y.1,353,006,911, and the electric power generated amounted to 1,405,825 kilowatts, of which 1,061,472 kilowatts are generated by hydraulic power and 344,353 kilowatts by heating. Compared with the end of last December, these figures show an increase of five companies, of Y.77,951,050 in aggregate capital and of 36,187 kilowatts in generated power.

Market for Electrical Equipment in Siam.—In a recent issue of "Eastern Engineering" reference was made to the satisfactory increase last year in the imports into Siam of electrical goods and apparatus from Great Britain. The United States, however, it should be pointed out, was the heaviest contributor of this class of machinery to Siam during the fiscal year 1919-1920, and it is believed that with greater enterprise Great Britain might easily improve her position.

Owing to the fact that no electrical apparatus of any kind is manufactured in Siam, there is a demand for all classes of such goods, with the addition of specialties needed for a tropical country. The import duty on all electrical goods is 3 per cent. *ad valorem*. There are no other restrictions in this trade, and it is not required to have the country of origin stamped upon any articles sold in this kingdom.

There has hitherto been no development of hydro-electric power in Siam, and in years with normal rice crops paddy husk is used for fuel, owing to its cheapness and the fact that the cost of oil, coal and wood is comparatively high, as compared with neighboring countries. Bangkok, it may be recalled, is as yet the only city in the kingdom furnished with electric light and power stations, of which there are two—the Siam Electricity Co., Ld., which is just adding a new 2,000-2,800-k.w. turbo-generation, and the Samsen Power Station. The former supplies light and power to the public generally throughout the city, while the latter is the municipal light and power station for Bangkok, also providing lighting for a large area occupied by royal palaces, and motive power for Bangkok waterworks for the opium factory, and the Siam cement works.

Weishien Electric Plant.—Weishien, one of the larger commercial centres of the province of Shantung, will soon have a modern electric light and power plant. The completion of the Weishien-Chefoo highway and the resulting influx of business has necessitated the move.

A New Chinese Venture.—A number of local Chinese are contemplating the opening of an electrical goods factory, with branches at Shanghai, Soochow and Wusih. The Chinese press states that the promoters are joining hands with the German firm, Siemens, for the manufacture of newly invented goods.

Plan for Hydro-Electric Plant.—Foochow Chinese merchants are interested in a scheme for a hydro-electric plant to develop power from the Min river. It is reported that American capitalists have been approached in connection with the proposed venture.

Hydro-Electrics in Japan.—Industrialists in Japan are alive to the development of their water-power resources to the full, and schemes of gigantic combines are being discussed. The Harima Hydro-Electric Company, with a capital of Yen 2,500,000, has only recently been amalgamated with the newly-organized Ryobi Hydro-Electric Company, Okayama prefecture, which has a capital of of Yen 5,000,000. The amalgamated concern will increase its capital to Yen 10,000,000. The combine aims at an output of 15,000 kilowatts. In the Kyushu district there is a proposal afoot to amalgamate the electric companies operating in the district. These companies are the Kyushu Electric Light Railway Company, the Kyushu Hydro-Electric Light Company and the Kyushu Electric Railway Company. There is also a new company, the Kyushu Power Transportation Company, about to be formed.

Weihsien-Fangtze Electric Plant in Progress.—The organization of the Weihsien-Fangtze Electric Plant of Shantung, promoted by Mr. Ma Chi-ping, is proceeding steadily. The plant at Fangtze has already been operated, and efforts are being made to hasten the inauguration of the plant at Weihsien. A piece of land on which to set up factory building has been purchased at Weihsien and a set of up-to-date machinery is being ordered from Shanghai.

Telephone and Electric Light Activities.—Surveys are being undertaken at Ch'ihfeng (Hata) in the Jehol administrative area for the installation of a telephone service and an electric light plant under semi-official auspices.

The Sun Fan Electric Light Company organized by Hsu Ts-tsin has petitioned the ministry of communications and the ministry of agriculture and commerce for registration.

The Kuang Hua Electric Light Company organized by Wang Yu-wan at Louhokou, has been registered by the ministry of agriculture and commerce.—*Bureau of Economic Information.*

Proposed Electric Power Scheme for Federal Malay States.—At a meeting of the federal council of the Federated Malay States, held at Kuala Lumpur during April, writes Consul Renwick S. McNiece from Penang, it was decided to engage an electrical investigation staff to investigate the question of a public power supply. The sum of $150,000 (Straits currency) was voted to defray the salaries and expenses of this staff, which included ten engineers, surveyors and draftsmen. A preliminary survey had already been made by the government electrical advisor, which called for an expenditure of approximately $40,000,000 (Straits). The development of a comprehensive electric power scheme would be of tremendous value to the industrial facilities of the Federated Malay States, and the application of low cost power to the mining of tins should greatly stimulate that industry.—*Commerce Reports.*

Proposed Electrical Moving Roadway, Japan.—The Japanese are now paying much attention to the improvement of their roads, and in this connection a project of a Tokyo capitalist, Mr. S. Hirao, to improve the traffic conditions between Motomachi, the principal shopping centre in Yokohama, and the Bluff, where there are a large foreign colony and some of the best houses in the city, deserves mention. The Jirozaka hill between Motomachi and the Bluff is a serious problem for motorists and ricksha-men, and Mr. Hirao proposes to build a moving road operated by electricity. He claims that the moving roadway is his own invention. In his application to the Mayor of Yokohama for permission to carry out his project, he points out that on the completion of his moving road he intends to levy a toll on vehicular traffic passing over it.

An Electrical and Engineering Co. Under Organization at Shanghai.—Mr. Sze Chao-tseng, director-general of the Lung-hai railway, is establishing, with some other Chinese capitalists, the Tseng Hwa Electrical & Engineering Co. at a capital of $1,500,000 with head office at Shanghai and branches at Soochow and Wusih. It is reported that the new company has entered into an agreement with the Siemens China Electrical and Engineering Co., Germany, stipulating that the former is to be the sole agent in China for selling the latter's productions and new inventions, and that no other companies in China are entitled to the same privileges.

COMMERCIAL FINANCE

Far Eastern Bank in Peking.—Messrs. Wu Yi ching and Nien Sho-wu with several Italian capitalists, are organizing the Far Eastern Banking Corporation in Tientsin with its branches in the various principal ports of China. The bank is capitalized at $5,000,000 which is said to have been fully subscribed.

Amoy Bank Established.—Referring to the establishment of an agriculture and industry bank in each prefecture in Fukien as instructed by the Foochow industrial bureau, the Agriculture and Industry Bank of Amoy has been organized with a capital of $200,000 by Mr. Wang Chin-yuan, a gentry of Amoy.

A Large Exchange Proposed by Japanese in Harbin.—Some Japanese capitalists in Harbin are proposing to organize a large exchange transacting stock and produce with a capital of $10,000,000 to be equally subscribed by Chinese and Japanese interests.

Sino-Scandinavian Bank is Granted a Charter by Peking.—The Chinese government has granted a special charter for the Sino-Scandinavian Bank, with a nominal capital of $10,000,000, and a minimum paid capital of $2,500,000. The bank has the right to issue paper currency. Mr. Chang Tien-tao, former minister of agriculture and commerce, has been elected president and Mr. Harold Skappel, Norwegian, vice-president. It is expected that the bank will open for business in Peking, Shanghai and Hongkong in October next.

The principal shareholders are Mr. Chi Wei-hsin, Shanghai cotton mill owner, Mr. Chen Chung-mei, president of the Canton Bank, and many influential persons in the service of the government. The shares on the Chinese side are oversubscribed.

GOVERNMENT FINANCE

Amendment to the Government Iron Foundry Funds Act Announced: Japan.—A statement appear in the Japanese official gazette, of the amendment of the Government Iron Foundry fund act as promulgated in 1905. The provision in the original law that the ministry of the department of finance may temporarily fill up the shortage in deferred circulating funds for the monopoly bureau and the iron foundry by a loan or by issuing accommodation papers to an amount not to exceed Y.90,000,000 for the monopoly bureau and Y.60,000,000 for the iron foundry, has been changed to read Y.98,000,000 in the case of the iron foundry. It is also added that the minister of finance may apply the national surplus money within the period of the fiscal year instead of issuing the loan or accommodation papers. The purpose of this amendment, it is believed, was to permit the government iron foundry to secure a loan of Y.98,000,000 in the hope of avoiding the necessity of dumping its stocks during the period of financial depression.

Chu Chi-chien and French Loan.—The *I Shih-pao* publishes a report that while in France, Mr. Chu Chi-chien concluded a loan amounting to 300 million francs, the proceeds to be appropriated in the following order :—

25 million francs to be spent for the up-keep of the Banque Industrielle de Chine, two hundred million francs to be used for the purchase of aerial machine sand appliances thereof, the syndicate advancing the money securing the monopoly of the supply, and the balance of 75 million francs to be appropriated by the Peking government.

$3,000,000 British Loan is Reported.—The *New Society* is responsible for the report that a concern called the British Royal Syndicate has arranged to furnish to the ministry of finance a loan of $3,000,000. The paper says that the loan is to be secured on the surplus funds of the customs, that the rate of interest is eight per cent., the price of the loan eighty-five, and that the cabinet has given its approval. The first payment, $1,000,000, is to be made on the day the loan is signed and the balance forty-five days later. The paper adds that the loan will be signed very soon.—*Reuter.*

FORESTRY

Kirin Governor Interested in Forestry.—Genera Shun Li-chung, military governor of Kirin, has designated two forest areas in the province of Kirin at Wenchun and Yenchi respectively to develop forestry. In each of the designated areas, a forestry bureau has been established and a commissioner appointed.

Forestry Co., Harbin.—Mr. Chao Tze-nan is establishing a forestry company at Harbin with a capital of $100,000 to plant and cultivate trees under modern methods. A tract covering 27,000 *mow* situated about 10 *li* north of Sung-kiang-chen has been purchased for the purpose.

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GENERAL

Economic Condition in Formosa.—There have been tremendous vicissitudes in Formosan business circles since the economic panic, states the *Japan Chronicle.* During the first half of the current years, 31 companies were created with a total capital of Y.19,403,000 (Y.6,916,000 paid-up); three extended their capital of Y.6,000,000 by Y.175,000; five wrote down their capital of Y.1,514,000 by Y.264,000; and 30, with a capital of Y.14,479,000 paid-up, went into liquidation.

Fishing Industry in China.—Several Shantung capitalists have raised a sum of $5,000,000 for the purpose of establishing a fishery company in Chefoo, to be known as the Hua Tung Co., Ltd. Sixty fishing boats are to be purchased and modern methods will be followed. The fishery area includes the Yellow Sea and Hoang Hai for the time being, but will gradually be extended later. The plans of the company cover :—

1. A well-equipped factory for the preparation of canned fish.
2. A fertilizer manufacturing company for fishery waste.
3. A fishery bank for the deposits of, or loans to, the people engaged in the fishery industry.
4. The collection of deep sea specimens for the purpose of exhibition.

The company has been registered at the ministry of agriculture and commerce.—G.B.E.I.

Ceilings Made of Newspapers, Manchuria: Works Needed.—The demand in Manchuria, China, for old newspapers is very great. These are used principally for the first layer of paper on interior walls and ceilings of houses. Chinese houses in Manchuria invariably include no ceilings when completed, the ceilings being installed by the tenants or owners after the masons and carpenters have completed their part of the contract. The ceilings are made of a framework of millet stalks, which are, as a rule, first covered with old newspapers and then with a layer of Chinese white paper. Partitions made in the same manner are also largely used in both shops and dwelling houses. Previous to the war old papers from abroad sold at 4½ cents a pound, while the prevailing price for Chinese and Japanese paper is now 3½ cents a pound.

Ningpo Merchants to Develop China's Fishery.—Ningpo merchants, Mr. Wu and Mr. Chang, are planning the establishment of a fishery corporation in Shanghai with the purpose of developing the fishery industry of China. Arrangements have been made with the fishers in Ningpo, Taichow, Wenchow and at the Kiangsu and Fukien coast for co-operation and mutual assistance.

Chih-feng to Establish Telephone and Electric Light Co.—The Peking government is contemplating to establish a telephone and electric light company at Chih-feng, and a Mongolian officer has been dispatched to undertake the enterprise

Hing-Noon Irrigation Co. Being Organized, Fukien.—The Hing Noon Agriculture and Irrigation Co., which is under organization with a capital of $200,000 by Messrs. Tsung, Shao and Ling, will be opened at Foochow in September, 1921. The corporation will be operated by electric power and a 72-H.P. boiler and a pumping engine, ordered from America, have arrived.

Bridges and Automobiles Required on New Roadway.—In connection with the construction of the proposed Shanghai-Minghong-Choling automobile road, it is estimated that, after careful surveying twenty-nine bridges are to be built along the whole line of 91 *li* long, and that over 900 *mow* of land are to be purchased. The Automobile Transportation Co. will soon place an order for twenty 30-H.P. passenger automobiles with a dimension of 18 ft. 3-in. long, 7-ft. 3-in. broad and 6½-ft. high, capable of running at a speed of 20 miles per hour and accommodating 25 persons, at a cost of about $7,000 each, and 4 freight autos at a cost of about 5,000 each. As Minghong is separated from Choling by the Whampoo river, two steam launches at a cost of about $4,000 each must be ordered to carry passengers over the river at the ferry.

The Future Prosperity of Chengchow, Honan.—After consultation with the Honan civil governor, Mr. Chang Tze-sui, industrial commissioner of Honan, has decided to develop Chengchow, the interesting point of the Peking-Hankow and Lung-Hai railways, by opening it as a commercial port. The first step is to establish a bureau to take charge of affairs regarding the execution of the scheme.

Latest Report of New Corporations Organized.—The following corporations have been recently registered with the ministry of agriculture and commerce :—

Yue Hua Cotton Spinning & Weaving Co.
Kichow Electric Light Co., Kichow, Kiangsi.
Beewax Co. of Kiangsu and Chekiang, Kiangsu.
Bank of Manchuria, Fengtien.

A New Road and Attendant Requirements.—The Szechuen provincial government has formulated a plan for the construction of an automobile road 22 ft. in width from Chentu to Chungking via Pih-shan and Loongchang. According to estimates, the scheme calls for an expenditure of about $2,000,000, which the authorities are endeavoring to devise some means to raise. Thirty motor buses will be ordered for use on the road and the journey will be made in 24 hours. The work is expected to take 6 months to complete, using ex-soldiers for labor. Mr. Liu Chun-shu, director of Hanyang Arsenal, has been instructed to take charge of the work and surveys of the line are being carried on by German engineers.

INDUSTRIAL

A Brick and Tile Manufacturing Co. Under Organization.—Mr. Chien Sing-tze is organizing the Tai-Shan Brick and Tile Manufacturing Co., in Shantung.

Taiyuanfu to Open a New Flour Mill.—A new flour mill named Tsing Foong is being established at Taiyuanfu, Shansi.

Two Mills Established in Chinkiang.—There have been recently established in Chinkiang two modern factories equipped with machinery; one by Mr. Li Chin-tze for satin weaving and the other named Teh-hua by Mr. Wang for silk weaving.

A Brick Plant Established in Sungkiang.—A modern brick plant equipped with German machinery commenced to operate in July at Sungkiang, Kiangsu. Its promoter is Mr. Shao Tsai-hua, a returned student from Japan.

A Cotton Weaving Mill Established, Sungkiang.—The Yung Tai Cotton Weaving Mill was established some time in May by Mr. Mee at Sungkiang.

A Paper Mill at Kashing, Kiangsu.—A paper mill to manufacture Chinese mulberry paper is being organized at Kashing, Kiangsu, with a capital of $50,000 by Mr. Cheng.

Newly Invented Cotton Making Machine Registered.—Mr. Li Pong-ji has formed a company with a capital of $10,000 at Lu-mar-tze, Peking, to manufacture artificial cotton with a new machine recently invented by him and registered with the ministry of agriculture and commerce.

Proposal of Two Factories, Wen-An Hsien.—The influential citizens of Wen-an Hsien, Chihli, have formulated a plan to establish a modern factory to manufacture cloth, to gin cotton and to make towels, and also a factory for girdle weaving and blanket making.

Bamboo Screen Making Machine Invented.—Mr. Hur Yang-chun has invented a bamboo screen making machine capable of weaving twenty screens from coarse bamboo in 11 hours and the new invention has been sent sent to the ministry of agriculture and commerce for registration.

A Canned Goods Manufacturing Co. Established, Chihli.—The Sing Chung Canned Goods Co. manufacturers of preserved goods and condiments has been established under the approval of the ministry of agriculture and commerce at Chang-lee Hsien, Chihli, by Mr. Yang Yung-shun with a capital of $100,000.

Anhwei to Have Five Model Factories.—The plan, as proposed by the industrial commissioner at Anking, for the establishment of five large model factories in the province of Anhwei is being carried out energetically. The first and second factories at Anking and Dung-chee respectively are approaching completion while the third, fourth and fifth ones at Fengyang, Hai-vee and Hsuan-chen respectively are still under organization.

A New Industry of China.—Mr. Wang Teh-chang, a native of Weihsien, Shantung, has raised a large sum of money for the purpose of opening a factory at Tsinan to manufacture nitric acid and sulphuric acid which have hitherto been imported from abroad.

Manufacture of Matches in China.—The manufacture of Chinese matches is growing rapidly and will soon be a serious competitor of the Japanese industry. There are now four factories in the neighborhood of Tientsin, and though one has had to close down the remaining three have a producing capacity of 4,000 tons a month. The actual monthly output is about 2,500 tons, as against a demand of 2,000 tons. Stocks in Tientsin and vicinity total 7,000 tons.

Latest Reports of New Corporations Established.—According to reports the following new corporations have been lately established :—

Lung Man Towel Manufacturing Co., Paoshan, near Shanghai.

Yi Wu Hosiery Manufacturing Co., Sungkiang, near Shanghai.

Kong Kee Hosiery Manufacturing Co., Soochow, Kiangsu.

Hwa Sun Dyeing & Weaving Co., Tientsin.

North China Steamship Navigation Co.

Chen Wu Cheng Zinc Mining Co., Chekiang.

Ming An Flour Mill, Tsinan.

Hwa Chang Hosiery Manufacturing Co., Shanghai.

Jih Sin Soap Factory, Peking.

Hing Kih Timber Co., Ltd., Kirin.

The Central Trading Corporation.

The Great China Fire & Marine Insurance Co., Chekiang.

Doong Pao Mining Co. (by Mr. Liang Shih-yi, address unknown).

Hung Chi Steamship Navigation Co., Lingshou, Chekiang.

Pu Chi Steamship Navigation Co., Lingshou, Chekiang.

Da Foong Weaving & Spinning Co., Shanghai.

Shih Nih Bank, Tientsin.

China Agriculture Co.

Chin Hwa Electric Machinery Co., Peking.

Progress of Cloth Factory. Hankow.—Being excellent in quality and cheap in price the various kinds of drapery manufactured by Chang Yung Chen Cloth Weaving Factory, Hankow, find a ready market. With this in view, Mr. Chang Kong-chen, proprietor of the factory, has ordered two additional machines to increase its producing capacity.

The Japan Bottle Industrial Co., organized with a capital of Y.350,000, quarter paid up. Bottle manufacturers. Office, 28 Sanchome, Nidori-cho, Honjo, Tokyo.

The Nihon Kozia Co. was organized recently with a capital of Y.10,000, quarter paid up, to manufacture cement. Office, 3 Itchome Yurakucho, Kajimachi-ku, Tokyo. Manager, Mr. K. Uyehara.

The Dai Nihon Artificial Marble Co., Ltd.—Capital Y.300,000, one half paid up. Office, 283 Yanaka, Nippori, Tokyo-fu. Managing Director, Mr. K. Murakami.

Cotton Manufacturers.—The Imperial Cotton Manufacturing Co., Ltd., organized recently with a capital of Y.50,000, one half paid up. Office, 1 Hichi chome, Aoyama kita machi, Shibuya, Tokyo, Manager, F. Fukuda.

Fukyo Medicine Co.: Capital Y.10,000.—Manufacturers of chemicals. Office, 10 Jinbo-cho, Kanda-ku, Tokyo. Mr. K. Kugen.

Kukuda & Co., organized recently, 93 Nishi Hirai-cho, Fukagawa-ku, Tokyo. Manager, Mr. Y. Fukuda. Woodcutters.

Machine Tool Manufacturers.—The Japan and America Industrial Machine Co., Ltd. organized recently. Capital, Y.30,000, one half paid up. Office, 2 Yamashita-cho, Kyobashi-ku, Tokyo. Manager, Mr. T. Yosai.

Hunan to Open Leather Goods Factory.—A new factory named Hunan Ngao-hua Leather Goods Manufacturing Co. with a capital of $20,000 is being organized by Messrs. Soong Ngao-kan, Wu Chien-hsun, Tang Sun-tze and Tso Tien-ju. Mr. Ping Pu-cheu has been appointed as manager and Mr. Zar Chen-king as assistant manager, and machinery and other necessary supplies are being ordered from the Loshan workshop.

Start Paper Factory.—A number of Chinese merchants have started a paper factory in Hsi-hoyen, outside Chienmen, called the Huakuo Paper Factory, which has been sanctioned by the government.

Pao Yuan Paper Mill.—Paper milling is a profitable undertaking in China. The two mills at Shanghai have been doing an exceptionally good business, one mill, the Lung Chang plant, is reported as having made a profit of several million dollars within a few years.

A New Cotton Mill.—An addition to the long list of cotton mills now in existence is a new plant that is soon to be installed at Pootung, the building occupying 40 *mow* of land. The mill is to be equipped with 100,000 spindles of Chinese manufacture and the engine and motors have been ordered from a German firm. The mill also plans to instal 800 hand cotton gins and twenty to be operated by oxen. Operations are expected to begin during August.

Textiles.—The Tung Hsing Spinning and Weaving Mill, a branch of the Ho Tung Spinning and Weaving Company, was organized last May with a capital of $15,000,000 ($3,700,000 actually paid-up). Its new buildings will be on Gordon Road and Yangtszepoo in Shanghai. Work will commence in September.

The Changchow Spinning and Weaving Company of Changchow, Kiangsu, has been registered by the ministry of agriculture and commerce.

The Hua Yu Cotton Weaving Company at Teh Yu-lee, Nanking Road, is being organized by Kiang Chuang-fu with a capital of Tls. 40,000 for manufacturing worsted goods. It has been registered by the Shanghai magistrate.

The Sui Tai Handkerchief Factory at Yangtszepoo, Shanghai, was organized by Pan Sui-kyieh, a Shanghai merchant, with a capital of $10,000. Work will commence as soon as all the machines have been installed.

The Chun Min Needle Weaving Co. on Jessfield Road, Shanghai, manufactures socks.

The Ching Feng Spinning and Weaving Mill of Kiangsu has been reigistered by the ministry of agriculture and commerce.—*Bureau of Economic Information.*

Japanese Equipping Their Own Mills.—Japanese companies are now manufacturing considerable quantities of sugar mill machinery, and equipment for at least two Formosan mills has been made entirely in Japan, says Carl K. Hedemann, engineer, with the New York division of the Honolulu Iron Works Co., who recently arrived in Japan from Formosa. Mr. Hedemann went to that island to superintend construction of a mill being built by the iron works company.

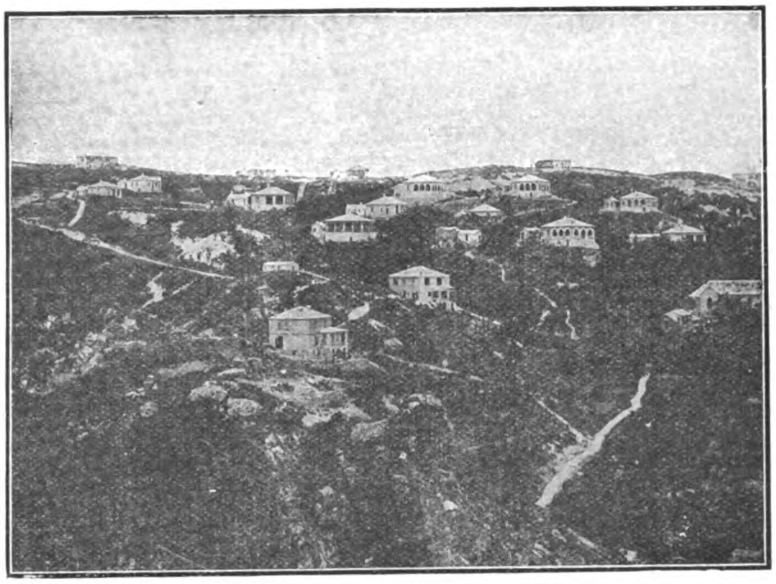
Nagoya Cement Company.—The Nagoya Cement Co., of Tokyo, which recently completed the construction of its manufacturing plant, has secured mining rights for limestone in Shiga and Miye prefectures. With its present equipment the company's production may amount to 200,000 barrels annually. It is said that the major portion of its production will be sold to hydro-electric companies.

Okawa & Co., organized recently to manufacture wire. Office, 98 Yeikyu-cho, Osakusa, Tokyo. Manager, Mr. M. Shishikura.

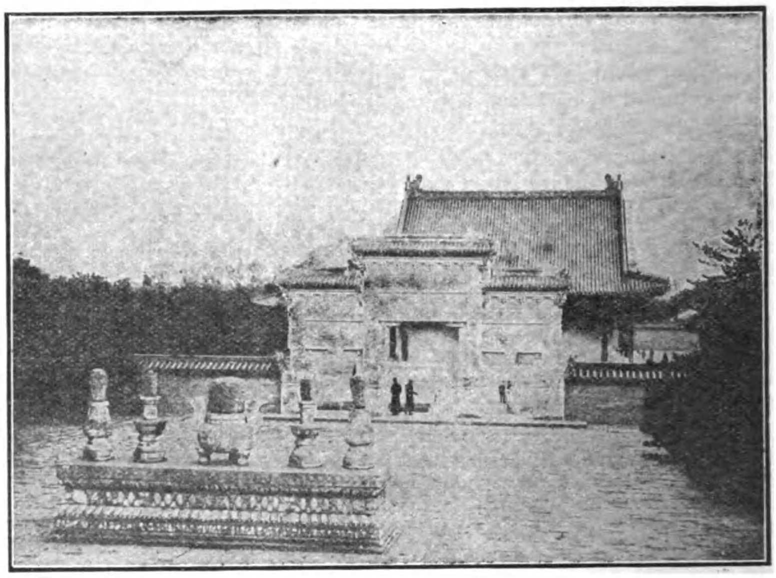
The Marudai Dye Co., Ltd., organized recently. Office: 527 Sotoyama, Namozui-cho, Osaka. Manager: Mr. G. Ito. Manufacturers of sulphuric dyes.

New Type of Weaving Machine Invented by Chinese.—Upon presentation of a new type of weaving machine recently invented by Mr. Wang Kien-chong, a Tientsin merchant, to the ministry of agriculture and commerce, the inventor has been granted all patent rights for five years.

CHINESE GOVERNMENT RAILWAYS



SUMMER RESORT AT CHI KUNG SHAN



TOMB OF EMPEROR YU CHENG NEAR LIANG KOW CHWANG

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THE Peking-Hankow Line, the most important section of China's overland route, enables tourists and travellers to get a glimpse of Old China, the train passing through magnificent scenery, traversing the great plains of Chihli, the central portion of Honan and the mountainous regions of the eastern Hupeh province.

The Peking-Hankow route joins at Fengtai the main line of the Peking-Mukden Railway, by means of which this line is connected with the railways in Manchuria, Korea, Japan, and Siberia, while steamer facilities at Hankow bring it into easy communications with the Yangtze River ports and Shanghai.

From the Capital to Hankow the journey occupies 34 hours, by the daily through train which is provided with up-to-date sleeping and dining accommodations.

In the future, this line will connect by means of a ferry-boat the Hankow-Canton Railway whose completion will bring the Capital of China, and Hankow, the Great Central Market, within easy distance of Canton the southeastern metropolie.

From the Capital to Hankow the journey about 30 hours by the bi-weekly "Express" through train which is provided with up-to-date sleeping and dining accommodations.

Chikungshan Mountain (Summer Resort).—Not many Summer Resorts in China inland, can bear comparison with the natural charming views, that reward those who ascend the mountain of Chikungshan, whose summit stands at an altitude of 1,980 ft. On reaching Sintien station, situated 110 miles from Hankow, a serpentine road climbs the mountain, on top of which are hundreds of beautiful bungalows awaiting vacationists. This popular resort is celebrated for its scenery, where an almost unbroken communion with nature can be enjoyed for a week at a time.

Hsi-ling or Western Imperial Tombs.—With their present-day accessibility, there is now little excuse for visitors to Peking omitting a trip to the Western Imperial Tombs, undoubtedly one of the most impressive sights in China. The site of these beautifully adorned Imperial Tombs is close to Liang Ko Chwang station, 79 miles from Peking, which is reached by a Branch-line, formerly built for the exclusive use of the Imperial Sovereigns when visiting the Tombs of their ancestors. The Western Tombs include the mausoleums of four Manchu Emperors and three Empresses, as well as those of a number of Princesses. The region, as a well laid-out park, closely wooded, is justly appreciated for the charming scenery surrounding the Imperial Tombs and is highly recommended to any one in search of the extraordinary and beautiful.

For Particulars, Pamphlets, Reservations, Tickets, etc., apply to the "Information Bureau" at Peking Head Office or to Tourist Agencies.

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Production of Sugar in China.—Although the production of sugar is one of the oldest of Chinese industries the development of beet has completely disorganized the Chinese trade. Formosa now almost equals China in sugar manufacture, whilst Java also has contributed a great deal to the decline of this country's industry. Mr. Ma Yu-shan, who has been studying the question in America, has interested himself in the problem, and has offered $5,000,000 for the erection of four factories in Hongkong and Shanghai. He also contemplates cultivating beet in the neighborhood of Tientsin, and sugar cane in Kwangtung. In view of the enterprise of Mr. Ma Yu-shan, his company has been granted a ten years' exemption from provincial likin tax. In the meantime, the Tsinan Po I sugar factory has been established for several months. The capital of the factory is $5,000,000. Two tons of beet seeds have been sown on the experimental farm, which is about 220 *li* in area. The machinery used for the manufacture of sugar is of American make. The daily consumption of beets is 500 tons and the amount of sugar turned out monthly is about 1,000 tons, and is mostly consumed in the provinces of Chihli, Honan, Anhui and Kiangsu. Two hundred and fifty persons are employed in the factory.

New Cotton Mill.—The Wing On Company is promoting a three million dollar cotton spinning mill at Shanghai.

Vermicelli Factory Opened, Harbin.—A vermicelli factory equipped with machinery was opened in June at Tung-tze-chia-tze, Harbin. The new company is capitalized at $200,000 and about 50 flour mills at Harbin are said to have been interested in the enterprise.

Weaving Machinery Factory, Harbin, Chinese Initiative.—Mr. Chao of Haiyang-hsien, Shantung, graduate of the Tsinan Normal School, has recently invented two kinds of weaving machines after seven years' hard study. The one made of wood capable of weaving towels or narrow cloth is particularly designed for the use of individuals, and the other made of iron capable of weaving cloth or satin in every design can manufacture eight pieces at one time when operated by a single worker. To reward his valuable invention, he has been granted a permit by the ministry of agriculture and commerce to work his inventions for a period of twenty years. A factory to undertake the new enterprise is being established with a capital of $1,000,000 at Sung kiang-chen, Harbin, by the inventor supported by his fellow countrymen.

A Modern Brewery Under Organization, Harbin.—Mr. Wu Yih-tang and several others are establishing a modern brewery named Chen-chang to be equipped with machinery with a capital of $1,000,000 at Taku-chia, Harbin.

A Lumbering Co. Being Organized in Kirin.—Mr. Chao Peng-dee, a wealthy and prominent merchant of Kirin, is organizing the Shun Kih Lumbering Co. with several others at a capital of $280,000.

A New Textile Plant in Kashing.—The branch of the Wei Chen Textile Plant of Hangchow is being established in Kashing, and is expected to operate in August, 1921.

Soochow To Establish A Straw Weaving Co.—A straw weaving factory to be operated by machinery is being organized at Soochow by Mr. Chen Kwei-kwei, a graduate of a certain higher technical school. The new factory will manufacture mats, straw hats, straw sandals, etc.

China National Sugar Refining Co. Under Organization.—The China National Sugar Refining Co., Ltd., is being organized at Shanghai with a capital of $5,000,000 to be divided into 100,000 shares at $50 each. Among its promoters, the most prominent figures are Messrs. Chang Chien, M. Y. San, C. C. Nieh, Chien Chao-nan and Dr. C. T. Wang.

A Gigantic Enterprise.—We are staggered, says the *Canton Times*, by a report in the vernacular press that certain Chinese capitalists from abroad are proposing to organize a huge company with a capital of $150,000,000 to establish a tea factory in Fukien, a sugar manufacturing and refining company in Kwangtung, a silk factory in Chekiang, a cotton mill in Kiangsu and a bank in Shanghai. Besides these enterprises, says the report, these ambitious capitalists are going to open a steamship company, and a mining concern. The sole object of the proposed organization is to manufacture and export native products and to import foreign machinery. Two gentlemen are said to have been appointed by the organization to make a general survey of the possibilities in China, while the chairman of the Chinese chamber of commerce at Rangoon and the chairman of the Chinese chamber of commerce at Manila will look after the matter of soliciting shares to the proposed organization.

Silk Weaving Plant at Soochow.—The modern silk weaving plant which was erected sometime ago by a Chinese company with a capitalization of $400,000 at Soochow is a success. The plant is equipped with 100 looms, seventy for satin and thirty for crepe, and can take care of spinning and dyeing. Twenty electric looms have recently been added.

Cement Plant Near Shanghai.—A cement manufacturing plant to be operated by Chinese capital will be erected soon near the Kiangnan Arsenal, Shanghai, according to the native press. The raw material is to be brought from Chinkiang.

Business Opportunities in North Manchuria.—The National Association of Manufacturers, New York, suggests that American firms interested in the development of the natural resources of northern Manchuria communicate with the Association of Engineers of the Railway Zone of the Chinese Eastern Railroad at Pravlenskaja Street, No. 41 Harbin, Manchuria, China. Manchuria is regarded as favorable for the development of saw mills and woodworking plants, tanneries, paper mills, bean oil mills and other industrial plants. There is some demand for mining machinery and supplies. The use of small motors for industrial purposes and river tug-boat and barge construction is expected to increase.

Another Cotton Mill in Wusih.—The King-Fung Cotton Spinning and Weaving Mill situated west of the Wusih railway station, promoted by Messrs. Sih Nan-ming, Shen Ngao-ching, Tsa Chien-shan and Tang Pao-chien, has started to operate. It is capitalized at $800,000 and equipped with 15,000 spindles.

Need for Sugar Mill Equipment in Java.—Opportunity for the renewal of plant is afforded in the sugar mills of Java, many of which are either out of date or in need of repair, writes Trade Commissioner John A. Fowler. Investigation has also shown that in the case of one of the finest mills in the island a very high percentage of sugar content is left in the cane. This is due to insufficient fuel supply and to waste of power, which should be considered in connection with the installation of further machinery, such as extra rolls and bagass burners, to bring these mills up to approximately 100 per cent. efficiency. While some of the 187 sugar mills operating in Java are small, others have two and four sets of rolls. A conservative estimate would place the average value of machinery for these mills on a pre-war basis, at approximately $750,000, representing about $140,000,000 worth of sugar mill machinery in Java. If figured on the basis of present-day prices, this amount would probably be doubled, and to bring these mills up to efficiency, without replacement, would require an additional investment of from 10 to 20 per cent. Because of the economy exercised during the war in repairs and extension of plants, it is believed that at least 70 of the Java mills will have to be replaced within the next few years. For the future of American sugar mill machinery interests in Java, it is essential to keep good men with a technical knowledge in this field. For a list of Java sugar mills refer to file No. FE-100, which will be loaned by the district offices or the far eastern division to interested parties.—*Commerce Reports.*

LIGHTING

China Demands Gas-filled Lamps. At the moment there seems to be a brisk demand in China for gas-filled lamps, but there are few, if any, such bulbs of British manufacture to be seen in the shops. Those offered for sale are mostly of Dutch or American manufacture. In view of the fact that in places like Hongkong, Shanghai and Canton the shopkeepers revel in rivalling Broadway in illuminations, there is a large scope for an enterprising salesman. In this connection it seems advisable to point out the disadvantages of appointing firms as agents having agencies for lamps of foreign origin; as the foreign manufacturers are always ready to offer very liberal terms to the agents, the latter find it more profitable to push the sales of foreign goods. The art of advertising one's goods in China also requires a judicious selection of the medium; indiscriminate advertising in all the papers published in English is not likely to produce satisfactory results, as 99 per cent. of these papers are never seen by the purchasing public.

MINING

Deposits Discovered in Manchuria.—Japanese mining engineers report that deposits of magnesite of great potential value have been found in Manchuria within a few miles of the South Manchuria Railway.

Gold Mining Development Bureau of Tung-Hua Engaging in Larger Mineral Areas.—The Gold Mining Development Bureau of Tung-Hua, Fengtien, whose activities have been hitherto limited to the Tung-hua Hsien, has been recently granted by the ministry of agriculture and commerce to develop a mine field covering an area of more than 1,000 *mow* at Hsien-mio-kiu in Ling-kiang, its neighboring district.

Gold in the Federated Malay States.—In 1920 there was placed on the market in the Federated Malay States 12,853 ounces of gold. 11,476 ounces were produced by the Australian Gold Mining Co. (Ltd.), at Raub, Pahang State. Perak produced 1,368 ounces and Negri Sembilan 9 ounces. The quartz mine at Raub, as the figures show, is the principal producer. The other gold is found with tin in the alluvium in Perak, and a small quantity in Negri Sembilan.

Iron Mine at Vee-See-Hsien to Operate.—Under the approval of government, an iron mine extending over 80 *mow* and 3,000 square feet located at Sha-tung-shan in Yung-an village of Vee-see-hsien, Yunnan, is being opened by Mr. Lee Yue-shen.

Copper Mine Discovered at Fuming Hsien.—Copper veins have been discovered at Lao-ching-shan in Fu-Ming Hsien, Yunnan, and chemical experiments have shown that the deposit consists of about 25 per cent. pure copper.

Pewter Mine Discovered, Tung-Ning-Hsien.—In the spare land belonging to Yue Ning Co., about 60 *li* south of Sui-feng river in Tungning-hsien, Kirin, there has been recently discovered a mineral deposit, white in color and light in weight, which the local inhabitants are ignorant of. Upon examination by experts it has been found to be pewter, and it is reported that some Russians are planning to develop the property.

Tientsin To Organize A Large Mining Co.—The Pei-Piao Coal Mining Co. is being organized in Tientsin by Chinese officials and merchants.

Mineral Survey in South Manchuria.—The production of steel on a commercial basis by the South Manchurian Railway Company is expected to result from the comprehensive survey of the company's coal and iron ore properties by six American geological and engineering experts, which will be completed August 24th, when the party will return to America. W. R. Appleby, dean of the School of Mines of the University of Minnesota, heads the party, which also includes W. J. Mean, professor of geology, University of Wisconsin; W. H. Emmins, professor of geology, University of Minnesota; Frank Hutchinson, consulting engineer and specialist on ore benefication of Duluth; L. D. Davenport, formerly chief engineer and W. Crago, formerly exploration engineer, for the Oliver Iron Mining Company of Duluth and Boston.

The Coal property which is to be examined is estimated to have about 1,200,000 tons deposit and a vein 150-ft. wide. It is now producing about 10,000 tons, which production it is hoped to double. The ore deposits are located at Fushun.

Mr. Yozo Tamura, who represents the South Manchurian Railway Company in America, is accompanying the experts.

Peking Ministry's Mining Report.—According to the report of the ministry of agriculture and commerce, during the month of May permission to operate mines was granted as follows :—

Mines	Location	Mineral Area	Merchant's Name
Coal	Hwei hsien, Honan	1 sq *li* 387 *mow* and 3305sq. ft.	Kuo Sung
..	Hsuan-chen, Anhwei	—	Liu Sing-tso
..	Wu-lung hsien, Kirin	2,144 6 *mow*	Lau Kuo-fan
..	Tsuyuanhsien, Shansi	—	Yang Tien chong
..	Pingtinghsien, Shansi	—	Ning Wei
..	Chuyungsien, Kiangsu	529.6 *mow*	Wang Tze men
..	Wei-chen-hsien, Shansi	6 sq. *li* 287 76 *mow*	Liu Z.o pang
..	Chang-shun-hsien Chekiang	1,906 4 *mow*	Loh Pah-hung
..	Wei-chen-hsien, Shansi	—	Feng Lu-yi
	.. ..	404.6 *mow* and 48 sq. ft.	Tsai Tlng-hsien
..	Datunghsien, Shansi	—	Nien Shi jui
..	Fan-chang-hsien Anhwei	841 1 *mow*	Lee Tee-yuan
..	Fu-sing, Jehol	5,250 *mow*	Han Quen-tai
..	Ning kuo, Anhwei	—	Shen Tsing ching

During the same month, the following deposits have been discovered and application for preliminary workings by the following named merchants were passed by the ministry :—

Mines	Location	Mineral Area	Merchant's Name
Coal	Shehsien, Honan	5 sq. *li* and 491 *mow*	King Jui
..	Shoneehsien, Shansi	—	Li Tze an
..	.. ..	4 sq. *li* 261 *mow* and 1220 sq. ft.	Tien Kien hsuan
..	Tsinchenhsien, Shansi	7 sq. *li* 510 *mow* and 4450 sq. ft	Chow Chao-hsu
..	Between, Datunghsien and Tsuyuanhsien, Shansi	6 sq. *li* 376 5 *mow*	Wei Sung-hua
..	Shoneehsien, Shansi	8 sq. *li* 483 *mow* and 2850 sq. ft.	Keng Tze-yue
..	Chinyenhsien, Kiangsu	—	Chen Hsien
..	Chinchen, Shansi	8 sq. *li* 455 *mow* and 3887 sq. ft.	Yao Chee-yao
..	Chin-cheng, Shansi	5 sq. *li* 533 *mow* and 1150 sq ft.	Pang Chien chin
..	Wei-chen-hsien, Shansi	300 *mow* and 3162 sq. ft.	Chao Chang keng
..	Pei-tsal-kew, Suiyuan	—	Liu Foong-tsai

OIL

Chinese Oil Resources.—In the June 2, 1921, issue of the *London Financier*, attention is drawn to the existence of rich oil deposits in China. In the province of Kansu, south of the desert Gobi, at the base of the Nanchung mountains and near the River Tsche-King-sia, are situated petroleum rocks. The oil, which is collected from daily accumulations in about a dozen wells of 3 feet, is used as lubricating and illuminating oil. In the mountainous district of the province of Shensi, about 100 miles southwest of the town of Ningtiaoliang, there are said to be rivulets of petroleum descending from great heights from red rocks and sands. There are also to be found in this district limestone, coal and large quantities of gas. The crude oil, which is of various colors, is used principally as an illuminant for lamps, the black, viscous oil being employed as a lubricant.

Although not the richest of China's oil resources, the best known are the petroleum wells of North Shansi, which for many years have supplied the country with illuminating oil. The petroliferous formations that distinguish the transcaucasian oil fields are known to cover a vast range and it is contended that some of the richest gushers will be developed in the Chinese section. Although the production of oil in China has been neglected in the past, there is substantial basis for the belief that the field offers great opportunity for the future development of a vast source of supply. The article in question, which goes into this interesting subject in great detail, may be obtained from the Far Eastern division.—*Commerce Reports.*

Fuel-Oil Supplies for Japanese Government.—The Asiatic Petroleum Co. (British), has recently completed a contract (through the Rising Sun Petroleum Co.) to furnish the Japanese government with 200,000 tons of fuel oil. When this contract is fulfilled the existing tanks of the Japanese government will be filled to capacity. New tanks, however, are being constructed. The efforts on the part of the Japanese government to buy out the oil interests of some subsidiary companies in the Dutch East Indies were not successful. Also the efforts of the government to develop the oil fields in Saghalien are meeting with little success, not because of the lack of oil, but chiefly on account of the remoteness of the oil fields and the severity of the climate which permits operations during not more than three months of each year.

Petroleum in China.—According to latest report, there are 22 petroleum wells in Chihli, 4 in Fengtien, 2 in Kirin, 13 in Kweichow, 17 in Yunnan, 8 in Shensi, 5 in Kiangsu, 4 in Kwangsi, 4 in Hunan, 4 in Kiangsi, 3 in Szechuan, 2 in Hupeh and 1 in Kwangtung, making a total of 91 wells of which Chihli, Kweichow, Yunnan and Szechuan possess the best.

Oil Mills in Tientsin.—The refined oil industry in North China is on the increase, eight mills now being in operation in the city of Tientsin. Four are of Japanese ownership, three of Chinese and one of Italian, the latter being established as the city's first mill. The Italian mill has a daily output of 6,000 catties of peanut, linseed and castor oils, and recently has increased its capitalization from $100,000 to $200,000. Its product, which is pressed by both the hot and cold process, is for export exclusively. The Sino-Japanese Oil Mill was originally started by a group of Chinese and was eventually sold out to Japanese interests. It has a plant valued at $100,000, which has a capacity for a day of twenty-one hours of 7,000 catties of peanut oil. The Peiyang Oil Mill is a pure Chinese concern with $60,000 capital. The Hsin Nun Oil Mill has a capitalization of $200,000 and is using the American method of extracting the oil. The Chun Wah Oil Mill specializes in cotton seed oil and has a daily capacity of 4,000 catties.

RAILWAYS

Cheng-kar-tung-Pei-ying-tai-lia Railway Under Construction.—The construction work on the prolonged section from Cheng-kar-tung or Pei-ying-tai-lai on the Sze-ping-kar-Cheng-kar-tung Railway is carried on steadily in spite of the rainy season which has now come in that locality. Up to present, a distance of about 20 miles westward from Cheng-kar-tung has been laid with rails, and judging from the present working it is generally believed that the new line may be opened to traffic within this current year.

Light Railway Proposal, Shantung.—Messrs. Hsu Pao-tien and Liang Chu-chien have secured a capital of $500,000 for the construction of a light railway from Pao-shan to Tai-an. The proposed line will have a length of about 120 *li* and will, when completed, bring Tai-an into connection with the branch of Kiaochow-Tsinan Railway, meeting together at Paoshan.

New Railway : Japan.—The proposed construction of a private railway along the eastern coast of Kabafuto, mainly for the purpose of serving the convenience of the paper mills in Kabafuto, was decided upon recently, and the railway company with a capital of ten million yen, will be established for that purpose.

Ssupingkai-Taonan Railway.—The Chengchiatun-Paiyintala extension to the Ssupingkai-Chengchiatun section already in operation, of the Ssupingkai-Taonan Line of the Chinese Government Railways promises to be opened to traffic provisionally by next November, when the next produce season gets well started. The Chengchiatun-Paiyintala section has been divided into three subsections, on which work was commenced simultaneously, and the rails are now being laid. It is 72 miles in length as against 50 miles of the Ssupingkai-Chengchiatun section, but the line traverses a level plain which is, by the way, quite fertile. The construction work has been progressing with ease, and no serious difficulty is likely to be experienced even in the rainy season. Sleepers are being supplied from Kirin way in a satisfactory manner.

Railways in Korea.—With regard to the business condition of the Korean railways for last fiscal year, an official in the Seoul office of the S.M.R. Company states that, on account of the inactivity of the transport business due to the general economic depression, the receipts of the company during the period have shown a considerable decrease, resulting in a loss of over Y.1,000,000.

When the estimates for last fiscal year were drawn up by the company, the transport business was most prosperous and nobody expected such a sudden advent of financial depression as overtook the empire last year. As a matter of fact, with the idea of making good the shortage the Company revised the freight tariff in June last year. The economic depression, however, had already set in at the time and receipts witnessed a marked decrease. To make matters worse, the transport business suffered a heavy blow through the great flood and the prevalence of cholera throughout the peninsula. To cope with the situation, the management did everything possible to curtail with the result that fuel alone showed a decrease by Y.780,000. Since the Korean railways came into the hands of the S.M.R. Company four years have elapsed, and though the Company realized a net profit of nearly two million yen for each of the first two years, that money had been invested in the railway undertaking in Korea. The last two years the Company suffered a loss of Y.1,850,000 in all and was obliged to make good that amount by a subsidy from the Tairen office.

In connection with the above it is understood that the business prospects of the Korean Railways for the current year show little improvement and rumor is afloat that further economy will be effected by a great reduction in the number of employees.—*Seoul Press.*

Harbin-Heilungkiang Railway May be Constructed.—Arrangements are being made by local authorities for the construction of the Harbin-Heilungkiang Railway, which is long needed, by Municipal bureau at Ma-kar-Jen-kow and raising appropriating a fund of $4,000,000 from the another $4,000,000 by other means. The sections between Fu-lan and Sui-hua and Sui-hua and Hai-lung will be built first.—*Chinese Press Report.*

Total Revenues of Chinese Railways.—The ministry of communications has recently promulgated a statement showing the total revenue from January 1 to April 30, 1921, of the various railways under the control of the ministry as follows:—

Name of Railway	Jan. 1 to Apr. 30 1921	Corresponding period, 1920
Peking-Hankow	$6,523,838	$191,180
Peking-Mukden	7,120,154	1,592,294
Tientsin-Pukow	4,892,461	324,890
Peking-Suiyuan	1,553,502	350,176
Shanghai-Nanking	1,891,485	272,449
Shanghai-Hangchow	851,947	135,840
Tsangting-Taiyuanfu	929,636	332,442
Canton-Kowloon	374,008	77,371
Kirin-Changchun	808,805	127,809
Daokow-Chinghua	252,551	7,007
Chuchow-Pingshiang	78,995	82,301
Chongchow-Amoy	10,184	5,563
Kaifeng-Laoyang	52,665	100,064
Canton-Hankow	480,290	24,605
Sze-Tao	205,212	78,412
Total	$26,699,736	$1,619,053

Would Extend Suiyuan Road.—The waichiaopu has suggested to the ministry of communications that, owing to the absence of communications in northwest China, progress in the construction of the North-Western Railway should be made as soon as possible. It is reported that the ministry of communications received this suggestion favorably, and is now considering a plan for the extension of the Peking-Suiyuan Railway from Suiyuan to Ninghsia.—*Reuter's Pacific Service.*

Negotiation Made for New Railway.—The Industrial Bank of Japan has been negotiating with the ministry of communications in regard to a loan for the construction of the Kirin-Huanining Railway, to run from Kirin through Yenchi and across the Tumen River into Korea.

Nantungchow Cotton Mill Building Light Railway.—With a view to faciliating transportation, the Dah Sung Cotton Spinning & Weaving Mill (No. 3), Nantungchow, has constructed a 12 *li* long light railway at north of the factory extending to Tsin-loong-kong, an important water way in that district. To make the transportation more convenient, a further distance of 2 *li* will be tracked, so that it can reach Tsin-loong-kong.

To Repair Light Railway.—In connection with repairing work of the Lo-yang Bridge, General Wu Pei-fu has decided to repair the light railway from Lo-yang to Loong-men first, so that materials for the re-construction of the bridge may be transported to the working place direct without any difficulty.

Feng-Huang-Tai to Establish Railway Station.—It is reported that the Kaifeng-Loyang Railway administration is planning the establishment of a railway station at Feng-huang-tai, a town between Chenchow and Chungmai, Honan.

New Rolling Stock to Tientsin-Pukow Railway.—It is reported that the Tientsin-Pukow Railway administration has obtained the approval of the ministry of communications for purchase of 50 passenger cars from a certain American corporation.

Improvement Work on Sze-Tao Railway.—Along the Sze-tao Railway, the old bridges which were roughly built are being replaced with new modern ones. In construction of the bridge over Laohu at Sankiang-kew, much difficulty has been experienced, but the difficulty has been finally overcome, and the work is expected to be completed in another month.

The work on the branch line from Chen-chiateng to Pei-ying-tai-lai was commenced from April 1, 1921, and the track is being laid at present. The construction work is carried on exclusively by native engineers.

RIVERS, HARBORS, WHARVES AND DOCKS

A New Port in Shantung.—With regard to the opening of a port at Tsiningchow, Shantung, it is reported that a company has been fully organized to carry out the scheme. It is said that the Shantung provincial authorities and the various ministries concerned in Peking are ready to support the undertaking. The company has already collected $3,000,000 and proposes that the government should furnish the remaining $200,000. It is understood that the ministry of finance has offered to provide treasury bonds for that amount, and that the shuiwuchu is considering the question of establishing a Customs station at the port.—*Reuter.*

Tai-Lu Lake Conservancy Work.—For the conservancy works of the Tai-hu Lake a sum of $300,000 has been allocated to Kiangsu and $200,000 to Chekiang by the Peking government. The work is being carried on by the Tai-hu Lake conservancy board under the directorship of Mr. Wang Tsing-mo. As recommended by Mr. von Heidenstam, engineer-in-chief of the Whangpoo conservancy board, a small dredging machine at a cost of about $240,000 will be purchased.

Port Improvement.—Sukeo, near Haichow, is, as mentioned recently, the proposed location of a new port as the maritime terminal of the Lung-hai railway now under construction and already operating between Hsuchowfu, on the Tientsin-Pukow Railway, and Kwanyintang in Honan province. A Belgian engineer has been engaged for the last few months in an investigation, and the final location of the harbor is now dependent on the report of the engineers who are now making a survey.

Conservancy Work of Nantungchow.—At a meeting held by conservancy exports at Nantungchow, Mr. Chang Chien dealt with the importance of the conservancy work and pointed out the careful survey of rivers, sluices, etc., as first step of flood prevention. In accordance with the decision of the meeting, four surveying parties composed of native and foreign experts were dispatched to carry out the survey in various parts of the district. After the survey work many sluices will be built at important places where circumstances render it necessary. A fund of $200,000 has been secured for this purpose.

Chang-Yi-Tung as a Commercial Port.—With regard to the improvement work of Chang-yi-tung, Kirin, the northern part of the city has been opened as a commercial port with modern roads built, while the southern part remains undeveloped. In order to improve the city, work will be immediately carried out in the southern portion.

To Build a Harbor at Lien-Shon-Wan, Fengtien.—The general chinese chambers of commerce in Mukden, Kirin, Harbin and Heilungkiang and the trade unions of the Three Eastern provinces have jointly telegraphed to the ministry of agriculture and commerce requesting the opening of Lien-shan-wan as a commercial port and building a harbor there. As the plan will involve a large amount, the merchants suggested that a loan of G.$10,000,000 should be made with American capitalists in the name of Chinese merchants and they asserted that they would hold themselves responsible for the loan.

New Port in Shantung.—With regard to the opening of a port at Tsingingchow (Shantung), it is reported that a company has been fully organized to carry out the scheme. It is said that the Shantung provincial authorities and the various ministries concerned in Peking are ready to support the undertaking. The company has already collected three million dollars and proposes that the government should furnish the remaining two hundred thousand dollars. It is understood that the ministry of finance has offered to provide treasury bonds for that amount, and that the shuiwuchu is considering the question of establishing a customs station at the port.

Harbor Works, at Moji and Shimonoseki.—The Japanese diet has sanctioned an appropriation of funds for harbor, reclamation and other works at Shimonoseki to the amount of Y.3,600,000, and at Moji to the amount of Y.4,050,000.

These sums are for preliminary work, to be spread over a period of six years. In Moji it is proposed to reclaim and re-arrange the waterfront so as to provide space for a wide road, an area for warehouses, a mooring wall 1,400 yards long, a coaling berth, and the usual appurtenances of cranes, etc. In Shimonoseki it is proposed to carry out reclamation and reinforcement of the water-front and to construct a small dock.

The sums mentioned above are obviously insufficient for a scheme of any great dimensions; a comprehensive plan which would solve the problem of furnishing a safe and convenient harbor, making full use of the terminal railway facilities, and concentrating in one place the now diffused activities of the two ports, does not appear as yet to have been seriously considered.

Some very imposing schemes have been talked about, but have presented difficulties which so far have proved insuperable. As for the proposed tunnel under the Shimonoseki Straits, it is stated in some quarters that it is to assist foreign trade, in others that it is for national defence, and in still others that it is to facilitate communications between Kyushu and the mainland. It does not appear clear, however, that it would make much difference to national defence, nor how it would assist foreign trade. So long as the bulk of the cargo of foreign-going ships is carried to or from central Japan, ships will go to ports in central Japan, and will call at Moji only for coal. The tunnel will not help the coal, for it is already on the Moji side.

As for the trade between Kyushu and the mainland, it is certainly active, but it is hard to believe that its volume would justify the cost of a tunnel, which would have only a limited carrying capacity, and would not be used for transporting the principal commodity, coal, which passes across the Straits.

It is considered possible that the tunnel scheme will be gradually dropped, at least for the present. It may be revived later if money becomes very plentiful; but even so, there are great technical difficulties to overcome.—*Board of Trade Journal.*

Tsiningchow to be Opened to Foreign Trade.—The proposal to open Tsiningchow (Tsining) in Shantung province to foreign trade has been approved by the central government, but the regulations to govern the commercial port have not yet been completed nor the date for the opening determined. Tsining, one of the largest cities in Shantung, with an estimated population of 200,000, is located on a spur of the Tientsin-Pukow railway, and is in one of the best wheat districts of the province. It is also on the Grand Canal, and if the plans for improving that waterway are eventually carried out Tsining is likely to become a provincial distributing centre of considerable importance. A mill equipped with American machinery, with a daily capacity of 2,400 bags, is already in operation. A modern egg-drying factory, with American machinery, is established there, as well as an electric-light works, also American equipped, which supplies light for the city.

A Floating Dock on the Yangtze.—According to the Hankow native press, the large floating dock, which for some time has been in course of construction by the Yangtze Engineering Works at Seven Mill Creek, has been successfully completed and launched. The new floating dock will prove a great convenience for the carrying out of repairs to vessels in the upper portion of the Yangtze.

ROADS

Tientsin Roads to be Extended in Width.—A scheme is being carried out in Tientsin to extend all the roads in width.

Tientsin-Tunghsien Road Started.—It is reported that the construction work on the road from Tientsin to Tung hsien, Chihli, has been commenced.

An Automobile Road Proposed, Anhwei.—Mr. Chen Kai-hsuan, a wealthy merchant of Anhwei, has proposed the establishment of an automobile service company and construction of an automobile road from Songchu to Pengpu via Kwei-yi, Bow-chow, Mon-cheng and Hwei-yuan, and it is understood that the proposal has received favorable consideration by the provincial authorities.

Road Repairing in Fur-Ping Hsien.—By order of the magistrate, some important roads in Fur-ping Hsien, Chihli, are being repaired and paved. The work will be done by famine sufferers.

SHIPPING

Pei Fong Steamship Navigation Co. Established, Tientsin.—The Pei Fong Steamship Navigation Co., capitalized at $700,000, has been established at Tientsin by Mr. Li Ching hsuan under the approval of the ministry of communications.

Chung-Hua Steamship Navigation Co. Re-Organized.—The Chung-hua Steamship Navigation Co., Hunan, which went into bankruptcy some time ago, has been taken over for business by the San-pei Steamship Navigation Co., Shanghai, at a cost of Hankow Tls. 180,000, has been re-named the Hung-An Steamship Navigation Company.

The Old "Kiangteen" to Go.—As the steamer *Kiangteen* running between Shanghai and Ningpo has become too old to render a satisfactory service, The China Merchants' Steamship Navigation Co. has ordered from Hsiang Sung Dockyard, Pootung, a new steamer to take its place. The new vessel to be named *Hsin Kiang Tien* is expected to launch in September.

TELEGRAPHS AND TELEPHONES

Telephone being Established at Kaoyue, Kiangsu.—The ministry of communications has sanctioned the request of the chief of the Telegraph Office of Kaoyue, Kiangsu, to have telephone system established in the city.

Telegraph Office Established in Kao-Yang-Hsien.—By order of the ministry of communications, a telegraph office was established at Kaoyang hsien, Chihli, and began to accept and send messages on April 28, 1921.

Telegraph Office at Wang-geo-chen.—Mr. Ting Kuo-chun, chairman of the chamber of commerce of Wang-geo-chen, at Tai-shun-hsien, Kiangsu, has requested the ministry of communications to establish a telegraph office in that locality, where a large business has been built up. It is stated that Mr. Ting has succeeded in raising a capital of $2,000, and that the proposal has received favorable consideration.—*Chinese Press Report.*

Telegraphic Equipment on Kirin-Changchun Railway.—In order to secure a regular service of telegraphic communication along the Kirin-Changchun Railway, a plan for the improvement of telegraphic equipment is being contemplated by the authorities concerned. According to the plan, telegraphic wire and posts will be installed along the line where there is no such equipment at present, some single wires will be doubled where circumstances render it necessary, and any old posts which have been found to become decayed will be replaced with new ones.

The Japanese Government will expend Y9,800,-000 on telegraph and telephone office and equipment (both wireless and wired).

Wireless Telephonic Communication between Fusan, Korea and Japan will shortly be effected.

A Cable between Seattle and Vladivostok.—The construction of a cable line between Seattle and Vladivostok via Alaska, the Kurile Islands (belonging to Japan), and the Soya Strait between Hokkaido and Kabafuto (Saghalien) has been decided upon. It is reported that a Bill therefor has been presented to the U. S. congress. The construction cost is put at G.$25,000,000.

A New Telephone Company.—The ministry of agriculture and commerce has registered the Shao Hsin, Chekiang.

TRAMWAYS

Hankow to Have Tramway System.—Mr. Lu Hung-yang, a wealthy merchant, has planned to establish a tramway system at the rear part of the city of Hankow, and has presented a set of regulations governing the new scheme to the local officials for approval.

Tsinan Tramway System Proposed.—With a view to facilitating communications, Mr. Mar Tai-ming has suggested the establishment of a tramway system at Tsinan, and an application has been made to the ministry of communications for permission to carry out his project. The aforesaid ministry is considering the proposal and has sent a representative to Tsinan to make investigations.

Tramways in Japan will be built as follows, government permission having been received: In Hokkaido, by the Hokkaido Colonial Co., 51 miles; and by the Uraho Coal Mining Co., 11 miles.

In north east Japan: 23 miles by the Hakozaki Tram Car Co.: 22 miles by the Kariha Tram Car Co.: 13 miles by the Sendai Tram Car Co.

Centre Japan: 296 miles by the Japan Electric Tramcar Co.: 47 miles by the Shonari Electric Co.: 29 miles by the Nagoya Electric Tramcar Co.: 26 miles by the Teuryn Electric Car Co.: 33 miles by the Teuryn Hydro-Electric Tramcar Co.: 32 miles by the Chita Tram Car Co.

Western Japan: 55 miles by the Ungei Tram Co.: 52 miles by the Chunan Tram Car Co.: 47 miles by the Geinan Tram Car Co.

Shikoku and Kyushu: 12 miles by the Imari Tram Car Co.: 46 miles by the Awa Tramcar Co.

WATERWORKS

Nanking Waterworks, Ltd. Being Organized.—At the meeting held in Nanking regarding the establishment of a waterworks, it was decided that the institution is to be named 'Nanking Waterworks Co., Ltd.' and that it is to be capitalized at $2,000,000.

Chinkiang Waterworks Planned.—Mr. Chu Chung-fu, a prominent merchant of Chinkiang, is again trying to establish a waterworks company at Chinkiang, which was proposed some years ago but afterwards reached a deadlock on account of lack of funds.

To Establish Waterworks: Kaifengfu.—In Kaifengfu, about ten *li* away from the Yellow River, water for drinking and cooking food is entirely obtained from the wells which are said to contain impurities. Messrs. Shen Chung-chin and Wang Kai-fong, Chekiang merchants residing in Kaifengfu, will establish a waterworks there. Schemes regarding the enterprise have been drawn up and the cost including machinery and reservoir is estimated at $600,000.

Waterworks Project at Hsuchowfu.—For some months there has been a plan on foot to instal a waterworks system to supply the city of Hsuchowfu with pure water. Hsuchowfu, writes Consul John K. Davis, is a city well located to become a commercial centre of some degree and importance. In the province of Kiangsu it is at the juncture of the Tientsin-Pukow and the Lung-Hai railways, and will soon be connected by a motor-car line with a town located on the Grand Canal. The source of the water supply is to be a number of artesian wells and the total initial cost of the scheme is said to be Tls. 150,000, equivalent to about $133,875 American currency. As the water obtained from wells is too hard for immediate use, it is planned to instal a plant in which water can first be filtered and softened by chemical treatment. It is planned at first to distribute water from hydrants located at convenient points in the streets. An American engineering firm has been consulted, and in the event the plan materializes will probably succeed in obtaining the contract for installing the plant.—*Commerce Reports.*

A Water Power Co. Proposed, Fukien.—Mr. Sung Fah-hsiang has proposed to establish a water power company with a capital of $20,000 at Hsienyu hsien, Fukien, where a water supply is easily obtainable from Kiu-li-hu and Kiu-loong-dai Lake. If the proposal proves to be successful, industrial plants there can be driven by means of the water power.

Kiangsu Tuchun to Promote Waterworks, Nanking.—General Chi Shih-yuan, tuchun of Kiangsu, will give an audience to the chairman of the Nanking chamber of commerce and several other local prominent merchants to discuss the early organization of a waterworks in Nanking, which was proposed a long time ago.

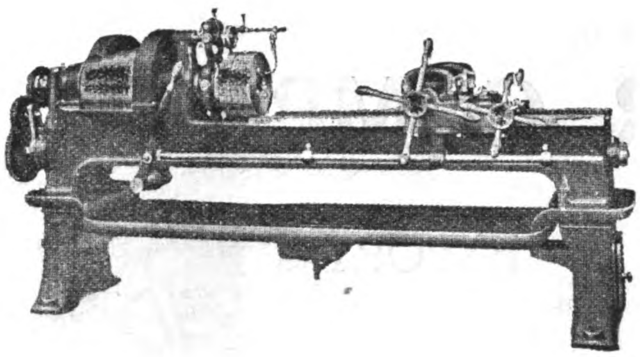
Two Waterworks Companies Proposed, Fukien.—Mr. Changhai Ching-yung has applied to the Foochow industrial bureau for permission to establish a waterworks Co. at Fong-tze-chin, Shen-han Hsien, and Mr. Liu Gee for a water works Co. at No-kow-chin, Chao-wu Hsien. The proposals are under the consideration of the authorities concerned.

WIRELESS

Japanese Building Radio at Tsingtau.—The Japanese authorities at Tsingtau have completed the construction of two wireless towers and are now awaiting the arrival of the necessary electrical equipment from Japan before opening the new wireless plant. The two towers have been constructed from material captured from the Germans in 1914, and the plant will, when fully equipped, be powerful enough to communicate with any wireless station in Japan.

Wireless Used in Indo-China.—It has been decided to utilize wireless telegraphy as a means of communication between Saigon and Hanoi. The submarine cable which connects Cochin-China and Tonkin is subject to frequent breakage, the cost of repairing which entails greater expense than the credits allowed, and for lack of credits it has been impossible to repair a breakage which occured in October, 1919. However, in order to assure continuity, permanence, and the regular service of telegraphic communications, the governor general of Indo-China considers the employment of the coast cable as still necessary, and he proposes to assure all the expenditures entailed for the latter out of the budget of the colony. This decision would place Indo-China in possession of a submarine cable which connects its two most important points, Saigon and Haiphong.—*Commerce Reports.*

The Machine you require in your Works.



PATENT AUTOMATIC BOILER STAY SCREWING MACHINE, WITH LEADING SCREW.

This Machine has been specially designed for screwing long Bolts, Boiler, Stays, etc. It is provided with an extra long bed so that threads 36 inches long can be screwed at one setting. A Leading Screw extending the full length of the bed, and rigidly supported at each end of the bed is fitted This ensures the thread being screwed perfectly true to pitch, which is of the utmost importance in Boiler Stays and certain other classes of work. The necessary pitch changes are obtained by means of change gears as on a lathe. The Machine is fitted with our Patent Hand and Automatic Releasing Motion, Automatic Closing Device, Micrometer Adjustment for making fine adjustments to the Dies, which can be done while the machine is in motion, Automatic Pump, two-speed Countershaft, etc.

The Machine is made in various sizes, and with two Heads.

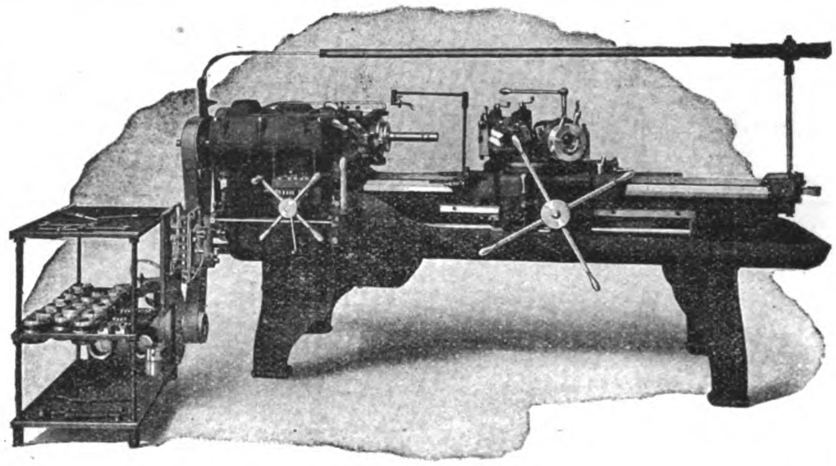
Further particulars will be furnished on application

JOSHUA HEAP & CO., LTD.,

ASHTON-UNDER-LYNE, ENGLAND.

Study This Outfit

IT PAYS DIVIDENDS



The machine is the 3 x 36 inch **Hartness Flat Turret Lathe.** The equipment is that used for bar and shaft work of all kinds.

This machine and this equipment **will increase the output per workman; will increase the output per machine.** They will put your shaft and bar work on a manufacturing basis without requiring costly special tools of any kind. This machine and equipment has been designed and built with this single aim :

To produce the greatest output per dollar of total investment on the part of the buyer.

Catalogue and descriptive literature sent post free on request

JONES & LAMSON MACHINE COMPANY

97 Queen Victoria St., London, England.
Cable Address: "Turretorum" London.

Springfield, Vermont, U.S.A.
Cable Address: "Turret" Springfield, Vt.

THE KOSTER COMPANY

IMPORT EXPORT

American and Foreign Development

HEAD OFFICE:
San Francisco, California, U. S. A.

BRANCHES:

NEW YORK	KOBE
SHANGHAI	MANILA
HANKOW	SOERABAYA
TIENTSIN	SINGAPORE
HARBIN	COLOMBO

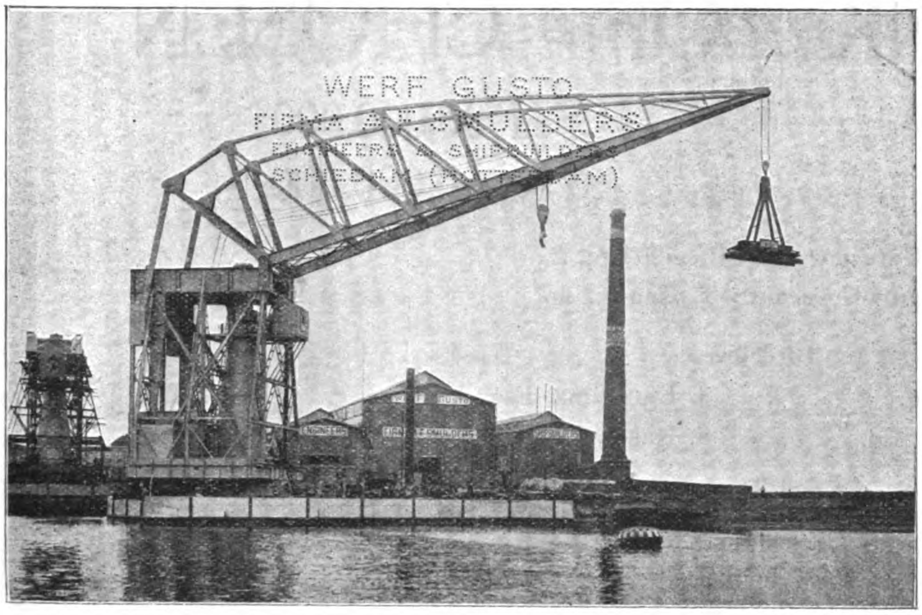
Cable Address: Koster

All Codes Used

WERF GUSTO (Firma A. F. Smulders)

SOLE AGENTS
IN
UNITED KINGDOM

ANDERSON RODGER
38 VICTORIA STREET, LONDON, SW 1. Tel. Vict. 3887



150-TON CRANE.

SHIPBUILDERS & ENGINEERS
SCHIEDAM, HOLLAND

FLOATING CRANES of great power, from 50 to 400 tons and more (of late years we have supplied 24 of these cranes from 60 to 400 tons.)

DREDGING PLANT of all types up to the largest capacities.

COALING VESSELS AND COALING ELEVATORS for bunkering steamers mechanically at rates from 150 to 1,000 tons per hour and upwards.

PASSENGER AND CARGO VESSELS, TANK STEAMERS, TUGS, Etc.

BOILERS of all kinds, land and marine.

BRIDGE, ROOF & CONSTRUCTIONAL STEEL WORK of every description by our own Boiler and Girder Works.

A. F. SMULDERS, Grace Berleur,
n/c Liege, Belgium.

International Confidence

The operations of international commerce are made possible through the confidence existing among the leading banks in different countries.

The National Bank of Commerce in New York is a link in this chain of international confidence.

Through its Foreign Department the Bank offers a complete international banking service to banks of the Orient.

National Bank of Commerce in New York

Capital paid up, $25,000,000 Surplus and Undivided Profits over $30,000,000 Resources over $500,000,000

THE BANK OF CHOSEN

Capital Subscribed - - - Yen 80,000,000
Capital Paid-up - - - Yen 50,000,000

Governor: S. Minobe, Esq.
Deputy-Governor: T. Kano, Esq.

Directors:

S. Ohta, Esq. S. Katayama, Esq.
S. Yoshida, Esq. S. Kakei, Esq.

Head Office: SEOUL (Chosen)

FOREIGN DEPARTMENT: TOKYO

(All communications relating to correspondence arrangements and the Bank's general foreign business to be addressed to the Foreign Department)

Branches:

Japan Proper—Tokyo, Osaka, Kobe, Shimonoseki
Korea—Chemulpo, Pyengyang, Fusan, Wonsan, Taiku, Chinnampo, Kunsan, Mokpo, Hoilyong, Chongjin
Manchuria—Antung, Fengtien (Mukden), Dairen, Yingkow (Newchwang), Changchun, Harbin, Tiehling, Liaoyang, Ryojun, Kaiyuan, Chengchiatun, Szupingchieh, Fuchiatien, Kirin, Lungchingtsun
China Proper—Shanghai, Tientsin, Tsingtao, Tsinan
Siberia—Vladivostock, Alexandrofsky Post

NEW YORK AGENCY:

The City Investing Building, 165 Broadway, New York City

LONDON REPRESENTATIVE:

Gresham House, 24 Old Broad Street, London, E. C. 2

Correspondents:

San Francisco, Seattle, New York, London, Paris and in other commercial centers throughout the world

International Banking Corporation

CAPITAL, SURPLUS AND UNDIVIDED PROFITS: G. $14,000,000

OWNED BY THE NATIONAL CITY BANK OF NEW YORK

HEAD OFFICE: 60 WALL STREET, NEW YORK
LONDON OFFICE: 36 BISHOPSGATE, E.C.
LYONS OFFICE: 27 PLACE TOLOZAN
SAN FRANCISCO OFFICE: 232 MONTGOMERY STREET

BRANCHES:

CHINA
CANTON
HANKOW
HARBIN
HONGKONG
PEKING
SHANGHAI
TIENTSIN

DOMINICAN REPUBLIC
BARAHONA
PUERTO PLATA
SAN FRANCISCO DE MACORIS
SAN PEDRO DE MACORIS
SANCHEZ
SANTIAGO
SANTO DOMINGO

INDIA
BOMBAY
CALCUTTA
RANGOON

JAPAN
KOBE
YOKOHAMA

JAVA
BATAVIA
SOURABAYA

PANAMA
COLON
PANAMA

PHILIPPINE ISLANDS
CEBU
MANILA

SPAIN
MADRID
BARCELONA

STRAITS SETTLEMENTS
SINGAPORE

BRANCHES OF THE NATIONAL CITY BANK OF NEW YORK

ARGENTINA
BUENOS AIRES
ROSARIO

BELGIUM
ANTWERP
BRUSSELS

BRAZIL
PERNAMBUCO
PORTO ALEGRE
RIO DE JANEIRO
SANTOS
SAO PAULO

CHILE
SANTIAGO
VALPARAISO

COLOMBIA
BARRANQUILLA
BOGOTA
MEDELLIN

CUBA
HAVANA AND 22 BRANCHES

ITALY
GENOA

PERU
LIMA

PORTO RICO
PONCE
SAN JUAN

SOUTH AFRICA
CAPE TOWN

URUGUAY
MONTEVIDEO

VENEZUELA
CARACAS

Commercial and Travellers' Letters of Credit, Bills of Exchange and Cable Transfers bought and sold. Current accounts opened and Fixed Deposits in local and foreign currencies taken at rates that may be ascertained on application to the Bank.

N. S. MARSHALL, *Manager.*

1A KIUKIANG ROAD.

BANQUE DE L'INDO-CHINE.

Capital	**Frs. 72,000,000**
Reserves	**„ 70,000,000**

HEAD OFFICE: 15 BIS RUE LAFFITTE, PARIS.

Succursales et Agencies:

Bangkok	Haiphong	Mongtze	Pnom-Penh	Singapore
Battambang	Hankéou	Nouméa	Pondichery	Tientsin
Canton	Hanoi	Papeete	Saigon	Tourane
Djibouti	Hongkong	Peking	Shanghai	

Bankers:

IN FRANCE: Comptoir National d'Escompte de Paris, Credit Lyonnais; Banque de Paris et des Pays-Bas; Crédit Industriel et Commercial Société Générale.

IN LONDON: The National Provincial and Union Bank of England, Ltd.; Comptoir National d'Escompte de Paris; Crédit Lyonnais.

The Shanghai Agency undertakes all banking operations and exchange business; grants credits on goods and approved securities and receives deposits on current and fixed deposits according to arrangement.

L. ARDAIN, *Manager.*

The First National Bank of Boston

Transacts commercial banking business of every nature

Correspondence Solicited

Capital, Surplus and Profits

$37,500,000

SOUTH AMERICA

We offer a complete banking service in the following countries, special attention being given to the handling of collections.

HEAD OFFICE: MONTREAL, CANADA

ARGENTINE	**BRAZIL**	**URUGUAY**
Buenos Aires.	Rio de Janeiro, Santos, Sao Paulo.	Montevideo.
VENEZUELA	**COLOMBIA**	**BR. GUIANA**
Caracas, Ciudad Bolivar. Maracaibo.	Barranquilla.	Georgetown, Rose Hall, New Amsterdam.

Also 90 Branches in

CUBA, PORTO RICO, DOMINICAN REPUBLIC, HAITI, COSTA RICA, BR. HONDURAS, BRITISH WEST INDIES and FRENCH WEST INDIES

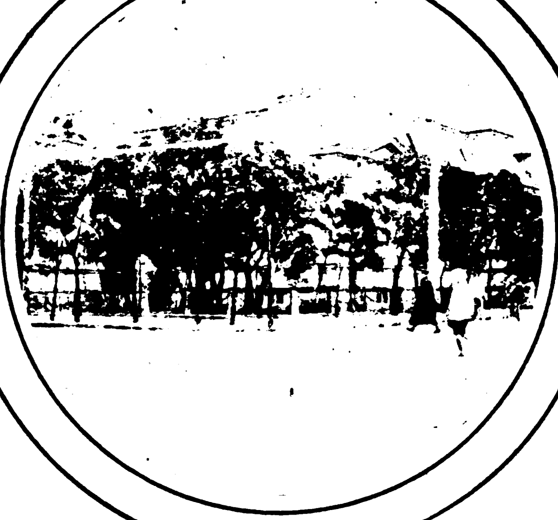
624 Branches throughout CANADA & NEWFOUNDLAND

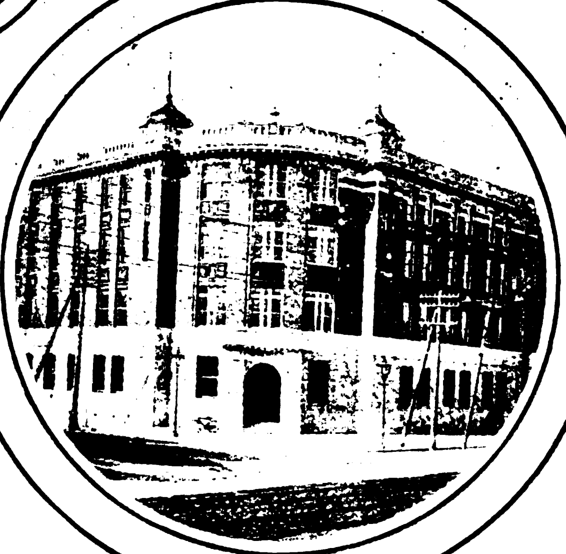
LONDON	**PARIS**	**NEW YORK**	**BARCELONA**
Princes St., E.C.	28, Rue du Quatre-Septembre.	68, William St.	Plaza de Cataluna 6.

THE ROYAL BANK OF CANADA

CAPITAL PAID UP & RESERVES $40,000,000

TOTAL RESOURCES - - $550,000,000





THE BANK OF TAIWAN LTD.

INCORPORATED BY SPECIAL IMPERIAL CHARTER, 1899

Capital Subscribed - - - - - - -	Yen 60,000,000
Capital Paid-up - - - - - - - -	,, 45,000,000
Reserve Funds - - - - - - - -	,, 9,680,000

President: KOJURO NAKAGAWA, Esq. Vice-President: SHUNROKURO MORI, Esq.

DIRECTORS:

TSUNEKICHI IKEDA, Esq.
KUMEMATSU MORINAGA, Esq.
GUNJI KAWASAKI, Esq.
MASUMI ESAKI, Esq.
TADASU HISAMUNE, Esq.

Head Office: TAIPEH, FORMOSA (TAIWAN)

BRANCHES:

JAPAN: Tokio (General Affairs Department), Kobe, Moji, Osaka, Yokohama.
TAIWAN: Keelung, Tainan, Takow, and 11 other points.
CHINA: Amoy, Canton, Foochow, Hankow, Kiukiang, Shanghai, Swatow.
OTHERS: Bangkok, Batavia, Bombay, Hongkong, London, New York, Semarang, Singapore, Soerabaya.

AGENTS AND CORRESPONDENTS:

In the Principal Cities and Towns throughout the World.

LONDON BANKERS:

BARCLAYS BANK, LTD. LLOYD'S BANK, LTD. LONDON COUNTY WESTMINSTER & PARR'S BANK, LTD.

TOKYO BRANCH:

No. 1, Eiraku-cho Ni-chome, Kojimachi-ku.

Telegraphic Address: "TAIWANGINK."

Phone Nos. 1060, 1061, 1062, 1063, 1064, 1065, 1066, 446, 447, 448 and 449, Marunouchi.

Interest allowed on Fixed Deposits, and Current Accounts on terms which may be ascertained on application. Most favourable terms are granted for Petty Current Accounts.

Every description of Exchange and General Banking business transacted.

Special facilities are available for exchange business on China, Straits Settlements, East Indies, Australia, Great Britain, Russia, America, Canada, South Africa, etc.

Banque Industrielle de Chine

CAPITAL AUTHORIZED - - - - - - -	Frs. 250,000,000
CAPITAL SUBSCRIBED - - - - - - -	,, 150,000,000
CAPITAL PAID-UP - - - - - - - -	,, 75,000,000
RESERVES - - - - - - - - - - -	,, 40,000,000

One-third of the Capital, i.e., Francs 50,000,000, subscribed by

THE GOVERNMENT OF THE CHINESE REPUBLIC

Statutes approved by the Government of the Chinese Republic on the 11th January, 1913.

President: ANDRE BERTHELOT
General Manager: A. J. PERNOTTE

HEAD OFFICE: 74 RUE SAINT LAZARE, PARIS.

Branches:

ANTWERP	HANKOW	MUKDEN	SINGAPORE
BATAVIA	HANOI	NEW YORK	SWATOW
BORDEAUX	HONGKONG	PEKING	TIENTSIN
CANTON	LE HAVRE	PNOM PENH	TSINANFU
DUNQUERQUE	LONDON	ROTTERDAM	VLADIVOSTOCK
FOOCHOW	LYONS	SAIGON	YOKOHAMA
HAIPHONG	MARSEILLES	SHANGHAI	YUNNANFU

BANKERS:

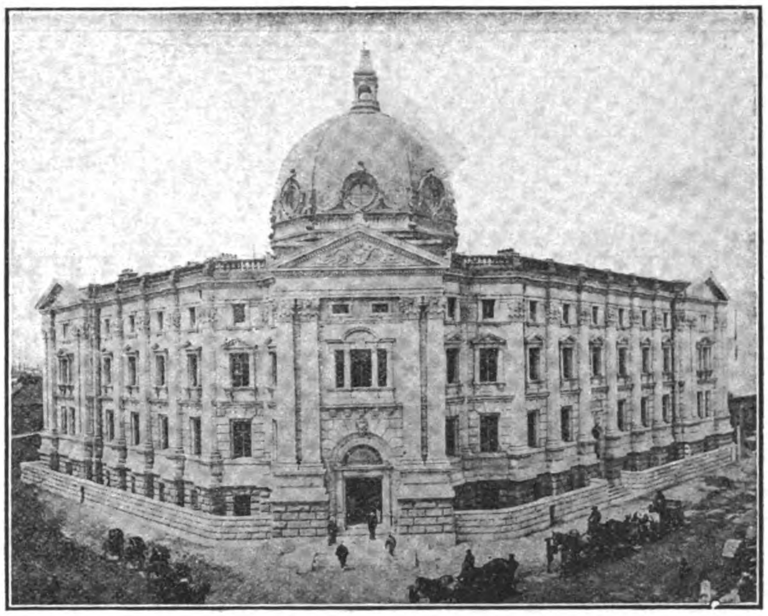
IN LONDON: The London Joint City and Midland Bank, Ltd., London.
IN FRANCE: Societe Generale pour favoriser le Developpement du Commerce & de l'Industrie en France.
IN ITALY: Banca Commerciale Italiana. Credito Italiano.

TAELS, DOLLARS, GOLD ACCOUNTS

Interest allowed on current accounts in Gold or local currency.
Savings account and fixed deposits. Terms on application.
Every description of Banking and Exchange business transacted.

B. ADAM, *Manager*.

1 French Bund, Shanghai.



HEAD OFFICE, YOKOHAMA

Capital (Fully Paid-Up):
Yen 100,000,000

Reserve Fund:
Yen 53,000,000

CORRESPONDENTS AT ALL THE CHIEF COMMERCIAL CITIES IN THE WORLD

The Yokohama Specie Bank, Ltd.

Established 1880

DIRECTORS:

President: NAKAJI KAJIWARA, Esq.
Vice-President: SHIMAKICHI K. SUZUKI, Esq.
NAGATANE SOMA, Esq.
YUKI YAMAKAWA, Esq.
MASNOSKE ODAGIRI, Esq.
BARON KOYATA IWASAKI
KONOJO TATSUMI, Esq.
FUKUSABURO WATANABE, Esq.
IWAO MATSUKATA, Esq.
MORINOSUKE MITSUI, Esq.
BARON KAISAKU MORIMURA
REITARO ICHINOMIYA, Esq.
KENJI KODAMA, Esq.
KIMPEI TAKEUCHI, Esq.
TARO HODSUMI, Esq.

Head Office: YOKOHAMA
Manager: H. MORI, Esq.

TOKYO BRANCH
No. 1, Itchome, Eirakucho, Kojimachi-ku.
Manager: K. MOGAMI, Esq.

BRANCHES AND AGENCIES.

Batavia	Dairen	Hongkong	Los Angeles (*sub-office of San Francisco Branch*)	Nagoya	Rangoon	Shanghai	Tientsin
Bombay	Fengtien	Honolulu	Lyons	Newchwang	Rio de Janeiro	Shimonoseki	Tsingtau
Buenos Aires	Hamburg	Kaiyuang	Manila	New York	Saigon	Singapore	Tsinan
Calcutta	Hankow	Kobe	Nagasaki	Osaka	San Francisco	Sydney	Vladivostock
Changchun	Harbin	London		Peking	Seattle	Sourabaya	

LONDON BANKERS

LLOYD'S BANK, LIMITED
LONDON COUNTY WESTMINSTER AND PARR'S BANK, LIMITED
NATIONAL PROVINCIAL AND UNION BANK OF ENGLAND, LIMITED
LONDON JOINT CITY AND MIDLAND BANK, LIMITED

Interest allowed on Current Accounts and Fixed Deposits on terms to be ascertained on application.
Every description of Banking business transacted.
For particulars, apply to the managers.

THE FIRM OF SUMITOMO

OWNERS OF BESSHI COPPER MINE, COAL MINE, ETC.

MANUFACTURERS OF

Tubes, Plates, Sheets and Bars of Copper Brass, Bronze and other Copper Alloys, Solid Drawn Steel Tubes, Nails, Electric Wires and Cables, Artificial Fertilizer, etc.

WORKS AND DEPARTMENTS

General Head Office	Osaka	Tokyo Sales Department	Tokyo
Besshi Copper Mine Office	Niihama, Iyo	Kure Sales Department	Kure near Hiroshima
Copper Sales Department	Osaka & Kobe	Yokosuka Sales Department	Yokosuka
Warehouses	Osaka, Kobe & Toyko	Hakata Sales Department	Hakata
Wakamatsu Coal Department	Wakamatsu, Chikuzen	The Sumitomo Yoko	Shanghai
Copper Works	Osaka & Amagasaki	The Sumitomo Yoko	Hankow
Electric Wire and Cable Works	Osaka	The Sumitomo Yoko	Tientsin
Fertilizer Manufactory	Niihama, Iyo	The Sumitomo Bank of Hawaii	Honolulu
Sapporo Mine Office	Sapporo, Hokkaido	The Sumitomo Bank of Seattle	Seattle

THE SUMITOMO STEEL WORKS, LIMITED

OSAKA, JAPAN

President: Baron K. SUMITOMO

MANUFACTURERS OF

Steel Ingots, Steel Forgings, Steel and Iron Castings of every description for Railways, Shipbuilding Yards, Mines, Hydraulic, Electric and other Engineering Works, etc. etc.

THE SUMITOMO BANK, LIMITED

OSAKA, JAPAN

Cable Address: "SUMITBANK"

President: Baron K. SUMITOMO

Capital Subscribed	**Yen 70,000,000**	**Reserve Fund**	**Yen 12,000,000**
Capital Paid-up	**„ 40,000,000**	**Deposits (30th June, 1920)**	**„ 360,000,000**

HOME BRANCHES:

Tokyo, Yokohama, Nagoya, Kyoto, Kobe, Hyogo, Onomichi, Niihama, Kure, Hiroshima, Yanai, Shimonoseki, Moji, Kokura, Wakamatsu, Hakata, Kurume.

FOREIGN OFFICES:

New York, San Francisco, Shanghai, Hankow, Bombay, London, Seattle (Affiliated Bank), Hawaii (Affiliated Bank).

AGENTS:

National City Bank of New York, New York. Lloyd's Bank Ltd., London.

The Bank buys, sells and receive for collection Drafts and Telegraphic Transfers, issues Commercial and Travellers Letters of Credit available in all important parts of the world, besides doing general Banking business.

THE

MITSUBISHI BANK,

LIMITED

CAPITAL SUBSCRIBED - Yen 50,000,000

CAPITAL PAID-UP - - - Yen 30,000,000

PRESIDENT:

Baron Koyata Iwasaki

MANAGING DIRECTORS:

Mr. Manzo Kushida Mr. Mikitaro Kikuchi

Mr. Kiyoshi Sejimo Mr. Takeo Kato

HEAD OFFICE:

No. 1 Yayesucho Itchome, Kojimachi-ku,
Tokyo, Japan.

BRANCH OFFICES:

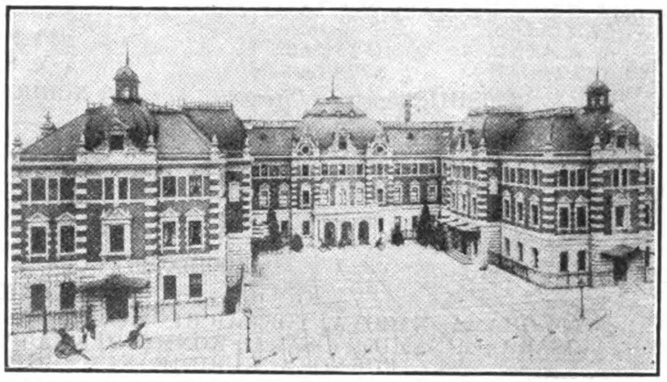
Fukagawa (Tokyo), Marunouchi (Tokyo), Nihombashi (Tokyo), Osaka, Nakanoshima (Osaka), Kobe, Kyoto, Nagoya, Shanghai, New York and London.

General Banking and Exchange Business

Agents for Hongkong and Shanghai Banking Corporation

THE MITSUI BANK, LTD.

The Oldest Bank in Japan, Founded in 1673



Capital Subscribed.......................Y. 100,000,000.00
Capital Paid-Up............................Y. 60,000,000.00
Reserve Fund (July 1921)......Y. 28,000,000.00

HEAD OFFICE:

No. 1 Suruga-cho, Nihonbashi-ku,
TOKYO

BOARD OF DIRECTORS:

GENYEMON MITSUI, Esq. (*President*); SEIHIN IKEDA, Esq., UMEKICHI YONEYAMA, Esq., NAOJIRO KIKUMOTO, Esq. and OTOHIKO MAJIMA, Esq. (*Managing Directors.*)

MORINOSUKE MITSUI, Esq., TOMITARO HARA, Esq., KANETARO KISHIMOTO, Esq., HIROKICHI KAMESHIMA, Esq. and KIKUSABURO FUKUI, Esq. (*Directors*).

Branches:

FUKAGAWA (Tokyo), HAKOZAKI (Tokyo), OTARU, YOKOHAMA, NAGOYA, KYOTO, OSAKA, NISHI (Osaka), KAWAGUCHI (Osaka), NAKANOSHIMA (Osaka), KOBE, HIROSHIMA, SHIMONOSEKI, MOJI, WAKAMATSU, FUKUOKA, NAGASAKI, SHANGHAI.

Foreign Agents:

London: Barclays Bank, Ltd.
London Joint City & Midland Bank, Ltd.

New York: The National City Bank of New York.
The Chase National Bank.
Bankers Trust Co.

Paris: Banque de l'Union Parisienne.
Comptoir National d'Escompte de Paris.

Bombay: National Bank of India, Ltd.

THE DAI-ICHI GINKO, LTD.

(FORMERLY THE FIRST NATIONAL BANK)

ESTABLISHED 1873

Subscribed Capital	- - -	Yen 50,000,000.00
Paid-Up Capital	- - - -	Yen 29,525,000.00
Reserve Fund	- - - -	Yen 29,500,000.00

Y. SASAKI, *President*

K. ISHII, *Managing Director.* Y. NOGUCHI, *Managing Director.* S. SUGITA, *Managing Director.*

HEAD OFFICE:

No. 1 KABUTO-CHO, NIHONBASHI-KU, TOKYO.

T. AKASHI, *Manager*

CITY BRANCHES:

ISECHO, SHIN-OSAKACHO, FUKAGAWA, MARUNOUCHI.

HOME BRANCHES:

YOKOHAMA, NAGOYA, YOKKAICHI, KYOTO, NISHIJIN (KYOTO), GOJO (KYOTO), FUSHIMI, OSAKA, NISHIKU (OSAKA), MINAMIKU (OSAKA), HONMACHI (OSAKA), KOBE, HYOGO, HIROSHIMA, SHIMONOSEKI, CHOFU, MOJI, FUKUOKA, KURUME, KUMAMOTO, HAKODATE, OTARU, SAPPORO, MURORAN.

BRANCHES IN COREA:

SEOUL, FUSAN.

LONDON & NEW YORK BANKERS:

London: London County Westminster & Parr's Bank, Ltd.; The London Joint City & Midland Bank, Ltd.; The Yokohama Specie Bank, Ltd.

New York: The National City Bank of New York.; The National Bank of Commerce in New York.; The Yokohama Specie Bank, Ltd.

CORRESPONDENTS:

The Bank, in addition to its own Branches, has numerous Agencies or Correspondents in the principal Cities and Towns at Home and Abroad.

THE EAST ASIA INDUSTRIAL

COMPANY, LIMITED

(TOA KOGYO KABUSHIKI KAISHA)

TOKYO

ESTABLISHED 1909

FINANCIERS AND CONTRACTORS

K. ARAI, Esq., *President*

R. SHIRAIWA, Esq., *Managing Director*

Subscribed Capital	. . . . . .	Yen 20,000,000
Paid-up Capital	. . . . . .	„ 11,500,000

Branches: SHANGHAI, PEKING, HANKOW.

Hongkong and Shanghai Banking Corporation

Paid-up Capital	...	$15,000,000
Reserve Funds: Sterling	...	£2,500,000
Silver	...	$21,500,000
Reserve Liability of Proprietors	...	$15,500,000

Court of Directors:

G. T. M. EDKINS, Esq. Chairman
G. M. DODWELL, Esq. Deputy Chairman
D. G. M. BERNARD, Esq.
A. S. GUBBAY, Esq.
Hon. Mr. P. H. HOLYOAK
A. O. LANG, Esq.
Hon. Mr. E. V. D. PARR
W. L. PATTENDEN, Esq.
J. A. PLUMMER, Esq.
H. P. WHITE, Esq.

Head Office:
HONGKONG

Chief Manager:
HONGKONG . . . Hon. Mr. A. G. STEPHEN

London Bankers:
LONDON COUNTY WESTMINSTER AND PARR'S BANK LTD.

Shanghai Branch: 12 The Bund
Sub-Agency: 9 Broadway

Branches and Agencies:

AMOY, BANGKOK, BATAVIA, BOMBAY, CALCUTTA, CANTON, COLOMBO, FOOCHOW, HANKOW, HARBIN, ILOILO, IPOH, JOHORE, KOBE, KUALA LUMPUR, LONDON, LYONS, MALACCA, MANILA, NAGASAKI, NEW YORK, PEKING, PENANG, RANGOON, SAIGON, S. FRANCISCO, SHANGHAI, SINGAPORE, SOURABAYA, TIENTSIN, TSINGTAO, VLADIVOSTOCK, YOKOHAMA

Interest allowed on Current Accounts and on Fixed Deposits according to arrangement.

Local Bills Discounted. Credits granted on approved Securities and every description of Banking and Exchange business transacted. Drafts granted on London and the chief commercial places in Europe, India, Australia, Africa, China, Japan and America.

G. H. STITT, *Manager.*

THE JUGO GINKO, Ltd.

(THE FIFTEENTH BANK)

TOKYO, JAPAN

Telegrams: "Jugoginko, Tokio"

Capital Subscribed Y. 100,000,000 Capital Paid-Up Y. 49,750,000 Reserve Funds Y. 17,478,600

President:
HON. IWAO MATSUKATA

Vice-President:
MASAYASU NARUSE, Esq.

Managing-Directors:
YUTSUHA SATO, Esq. KANESATO AIKO, Esq.

Directors:
BARON KOKICHI SONODA
MARQUIS YORIMICHI TOKUGAWA
VISCOUNT YUKIYOSHI AOYAMA
HON. NAGAYUKI ASANO
YOSHITERU SHIMIZU, Esq.
MASAO MATSUKATA, Esq.
KIYOSUMI TANIKAWA, Esq.

Auditors:
MASAKAZU HISANO, Esq.
BARON MICHITOMO IWAKURA
NAOYOSHI YAMAMOTO, Esq.
TAKAJI SEKIGUCHI, Esq.
TAKAYUKI IMAI, Esq.

***Head Office Manager:* Kiyosumu Tanikawa, Esq.**

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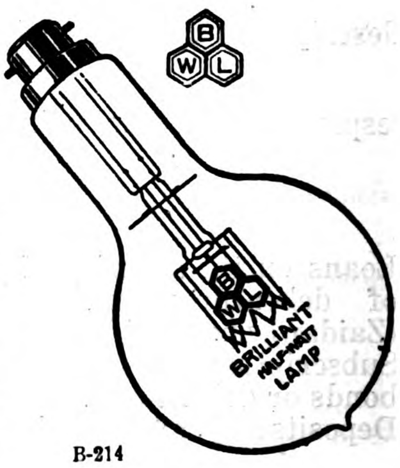

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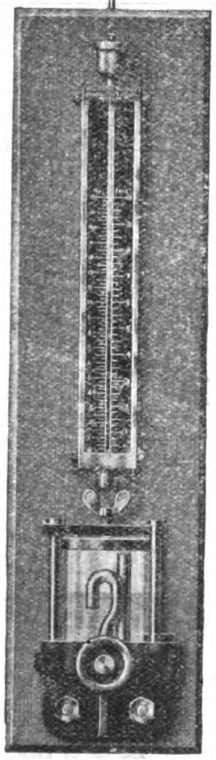

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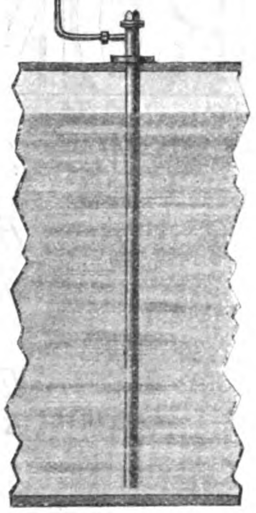

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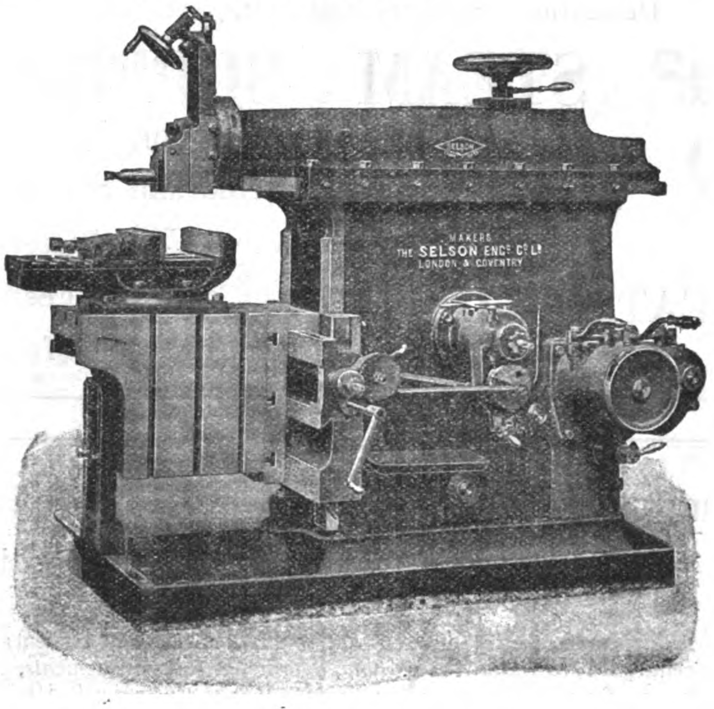

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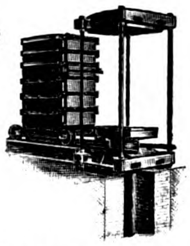

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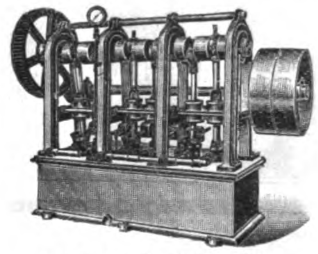

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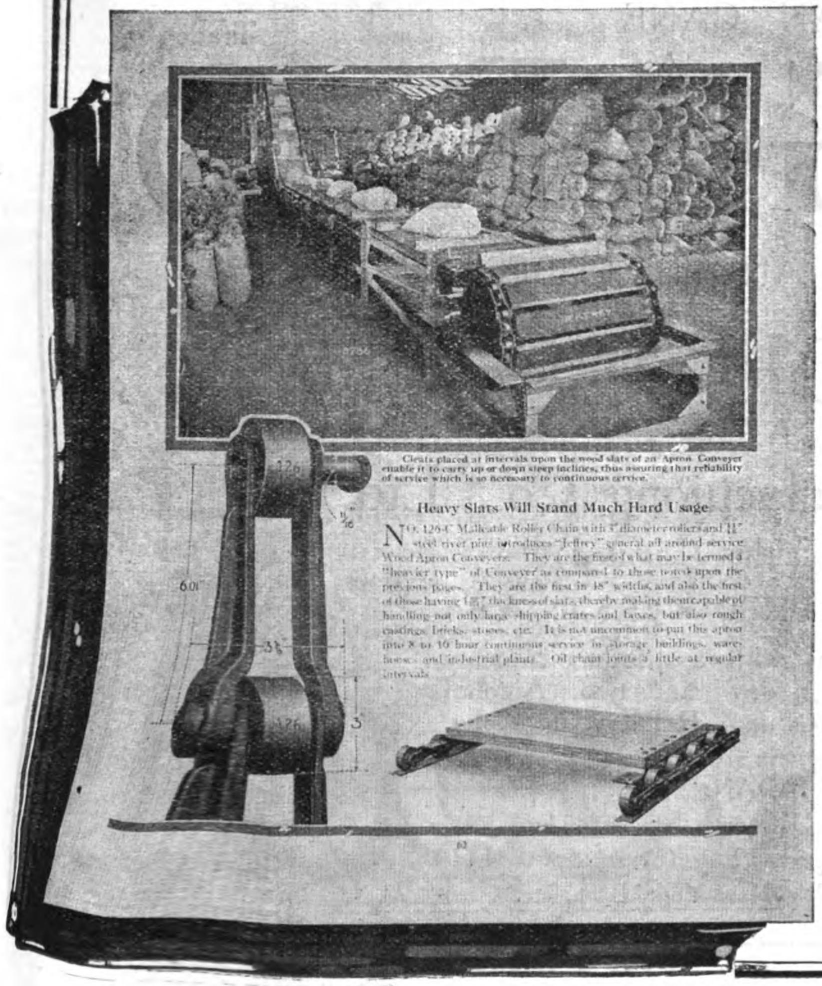

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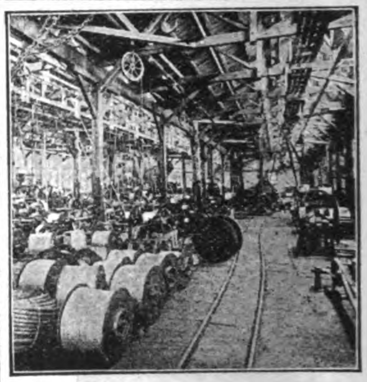

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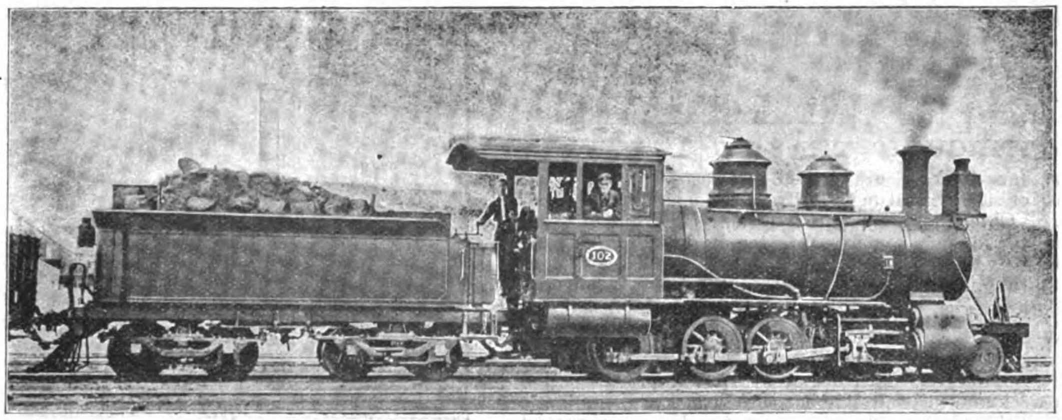

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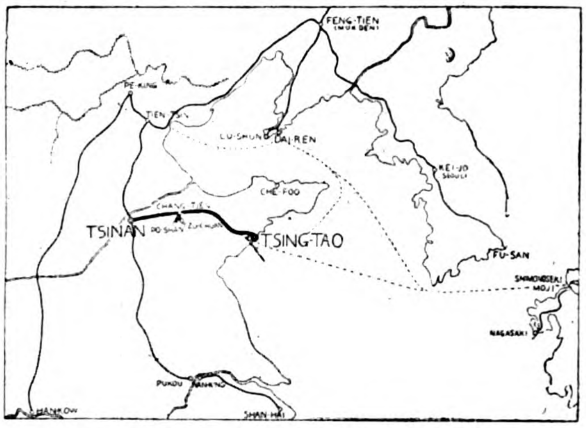

THROUGH TRAFFIC

Through passenger tickets are issued between the following principal stations of the Shantung Railway: Kiaochow, Kaomi, Fangtsu, Weihsien, Chingchow, Changtien, Choustun, Tsinan, Tzuchuan, Poshan, and the following points: In Manchuria—Port Arthur, Newchwang, Liaoyang, Fushun, Mukden, Tiehling, Kaiyuan, Changchun, Penchihu, Antung, and Dairen; in Japan—Tokyo, Yokohama, Nagoya, Kyoto, Osaka, Kobe, Ujina, Moji, Shimonoseki, Nagasaki and Shanghai.

Steamer Connections—Steamers leave the wharves of the Large Harbour, Tsingtao, for Moji and Kobe every five days, for Shanghai about twice a week and for Dairen about three times a week.

For giving facilities to through passengers for Japan, a special train in connection with the night train No. 4 is operated from the Harbour Station to the Wharf, direct alongside the ship, on those days when the liners of the Nippon Yusen Kaisha, Osaka Shosen Kaisha, and Harada S.S. Co. are leaving.

Through passengers and their luggage are carried free of charge for this section.

Collieries—The Tzuchuan (Shisen) and Fangtzu (Boshi) Collieries are managed by the Mining Department of the Shantung Railway. At present the daily output of Tzuchuan coal is about 1,500 tons, far surpassing the amount taken out when the Germans were in control. The coal is well-known for its good quality and fair price.

Tsinan—Tsinan, the capital of Shantung, is the western terminus of the Shantung Railway, and also one of the most important stations on the Tientsin-Pukow Railway.

The Tsinan Railway Hotel, furnished in modern European style, is found on the upper floor of the Tsinan Station, under the control of the Shantung Railway Administration.

THROUGH TRAIN SERVICE

Train No. 1 leaves Tsingtao daily 8.00 a.m. arrives Tsinan 6.30 p.m.
Train No. 3 leaves Tsingtao daily 9.30 p.m. arrives Tsinan 8.30 a.m.
Train No. 2 leaves Tsinan daily 8.00 a.m. arrives Tsingtao 6.30 p.m.
Train No. 4 leaves Tsinan daily 11.00 p.m. arrives Tsingtao 9.30 a.m.

Local Trains run between Tsingtao and Kaomi, Weihsien and between Fangtzu and Tsinan, and on the Poshan and Tzuchuan colliery branches.

Fares—Tsingtao-Tsinan—1st class, $14.30; 2nd class, $7.20.

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Connections at Tsinan—By Tientsin-Pukow Line with Tientsin, 6.00 & 9.38 a.m. daily, and with Pukow, 7.44 a.m. & 10.21 p.m. daily.

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The buildings are constructed principally in modern European style, with red tiles and white walls, contrasting pleasantly with the surrounding green mountains and blue sea.

The climate here is fine from Spring to Autumn, being neither too hot nor too cold. These climatic conditions make the place a favourite summer resort for Europeans and Americans from Shanghai, Tientsin, and other places.

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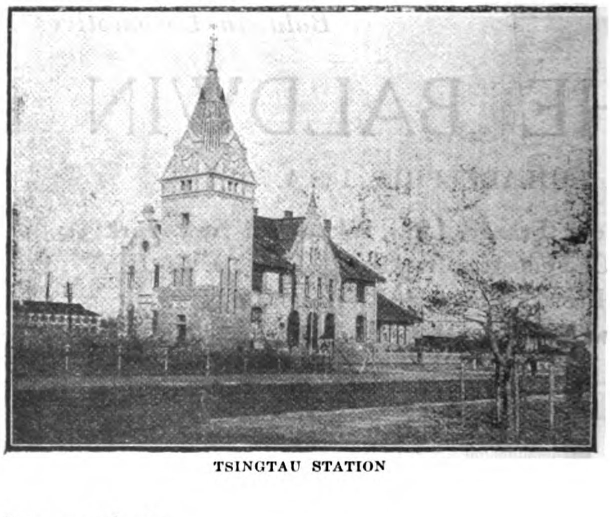

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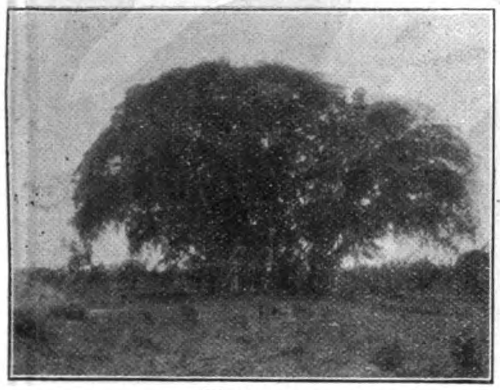
Waringin.

Java, the peerless gem in that " magnificent Empire of Insulinde, which winds about the equator like a garland of emeralds," is the ideal tropical island, the greenest, the most beautiful and the most exquisitely cultivated spot in the East, the most picturesque and satisfactory bit of the tropics anywhere near the world's great routes of travel.

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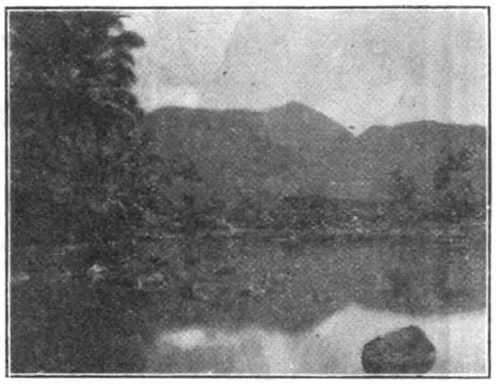
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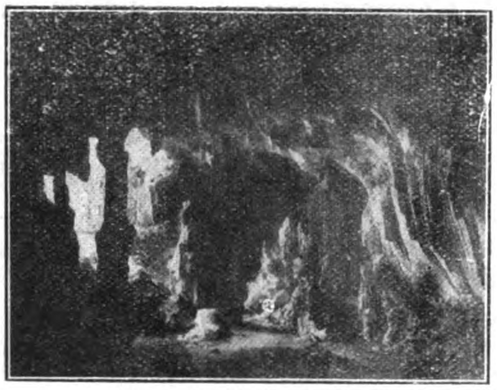
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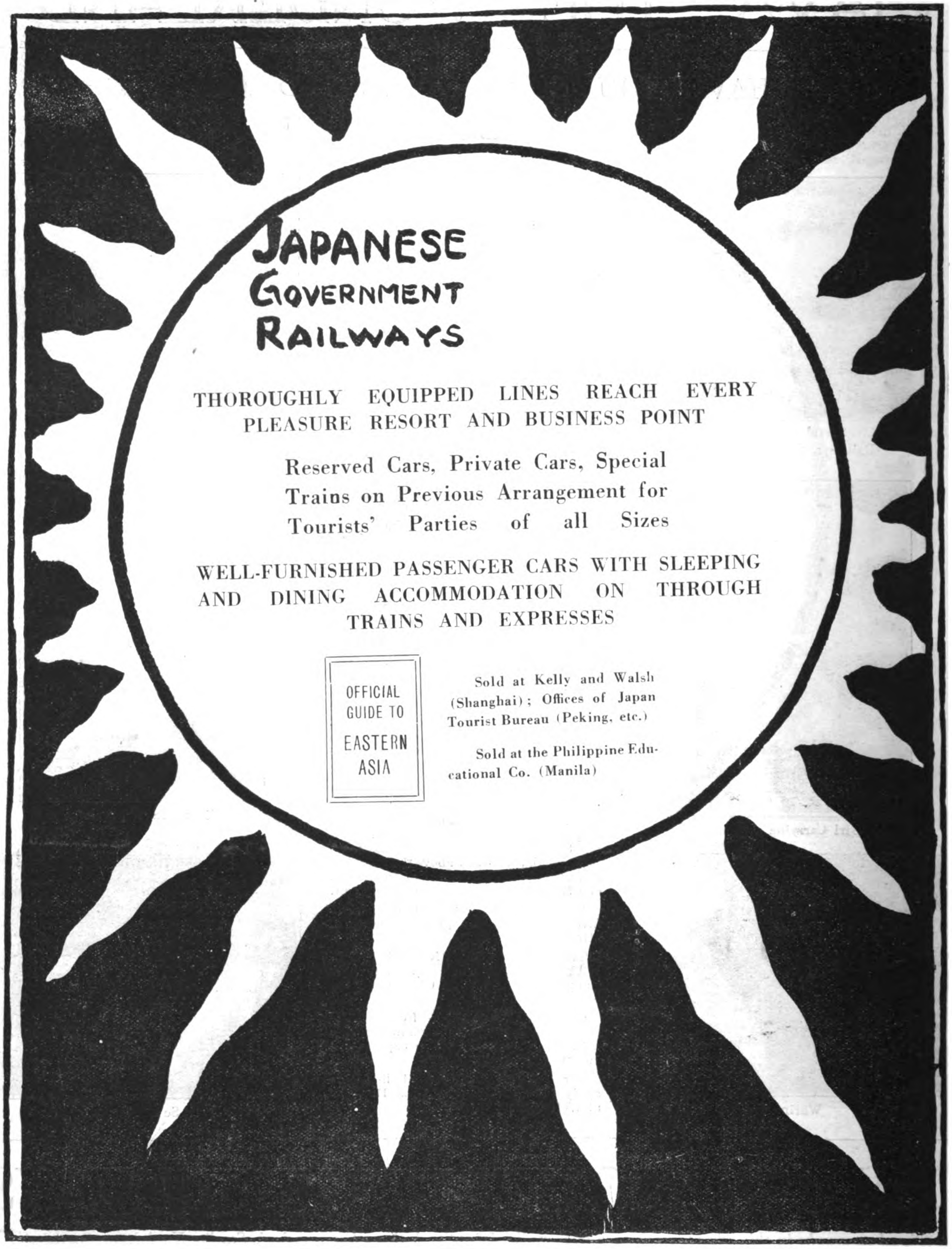
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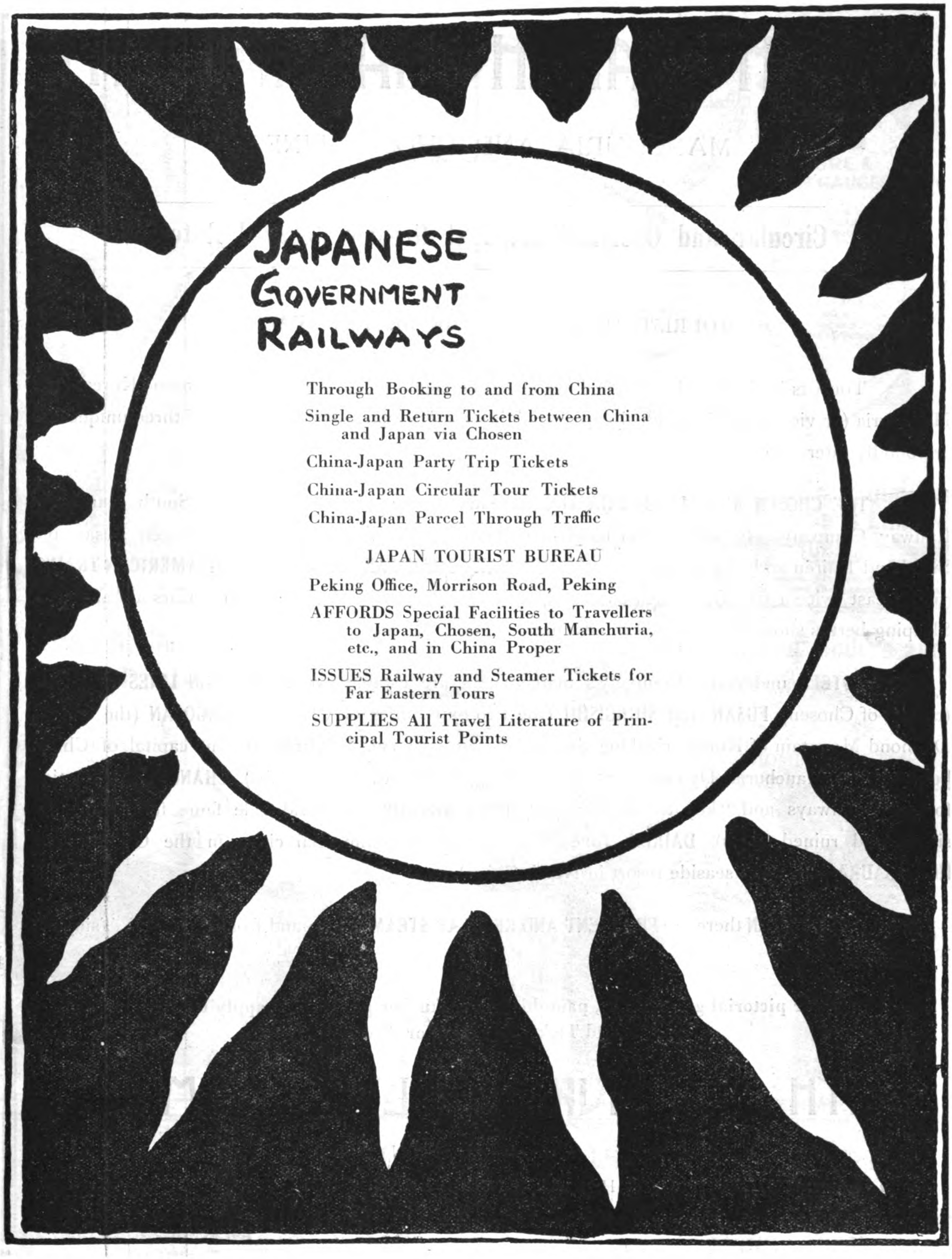
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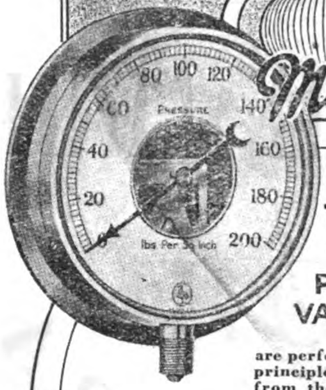

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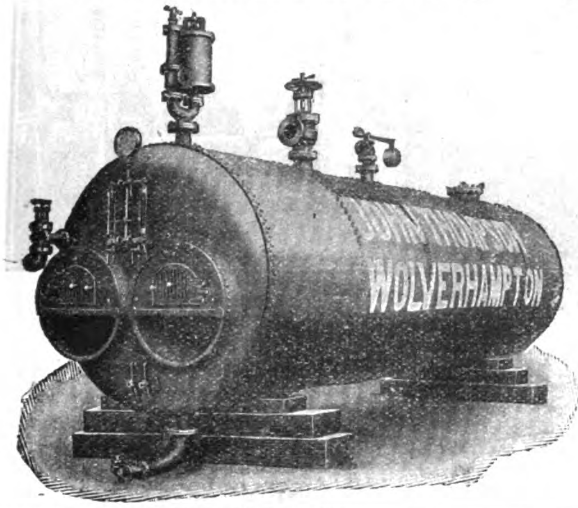

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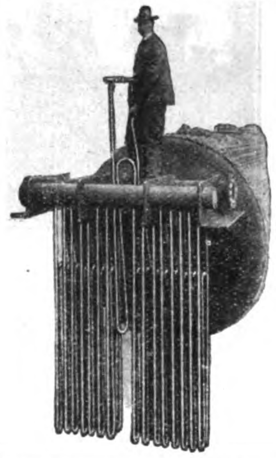

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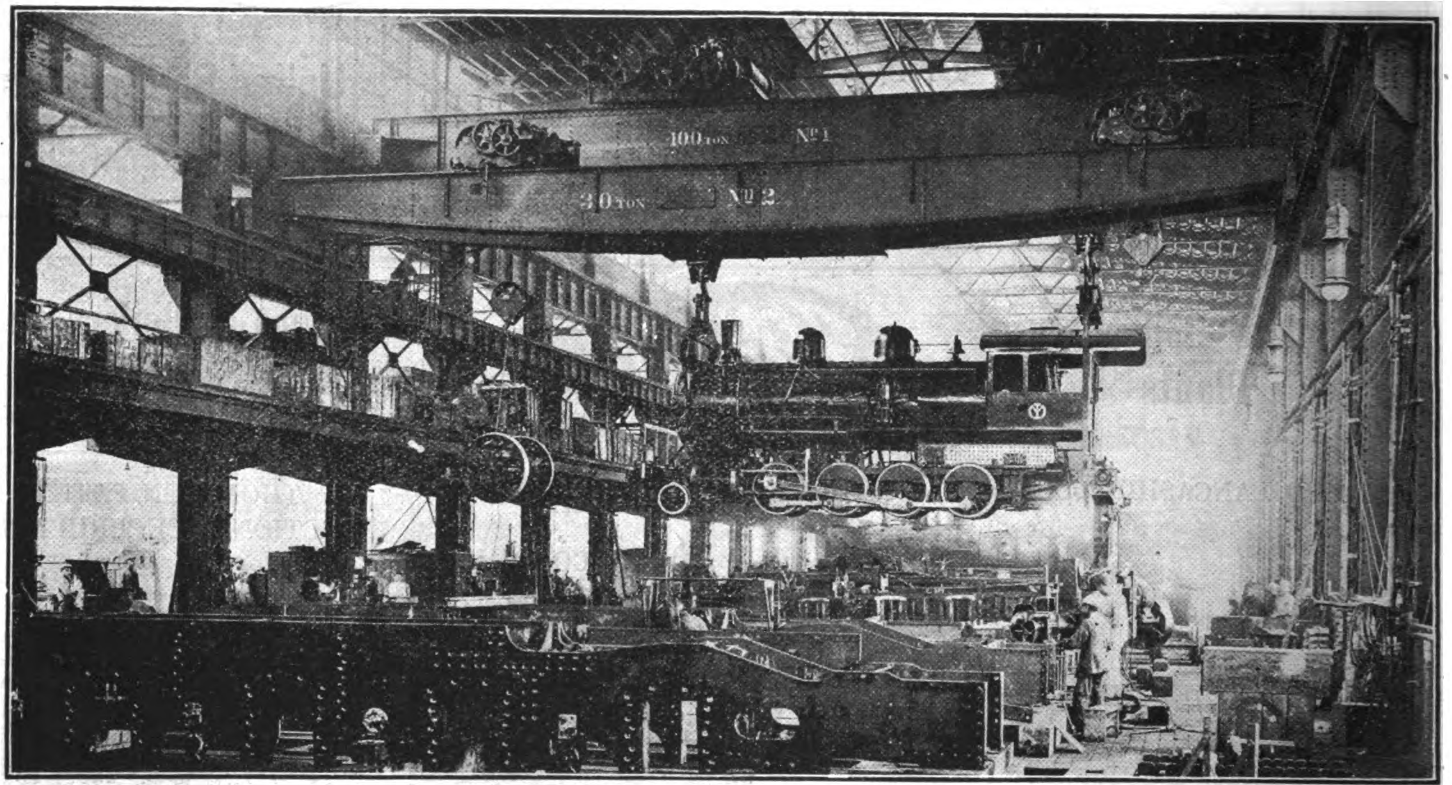

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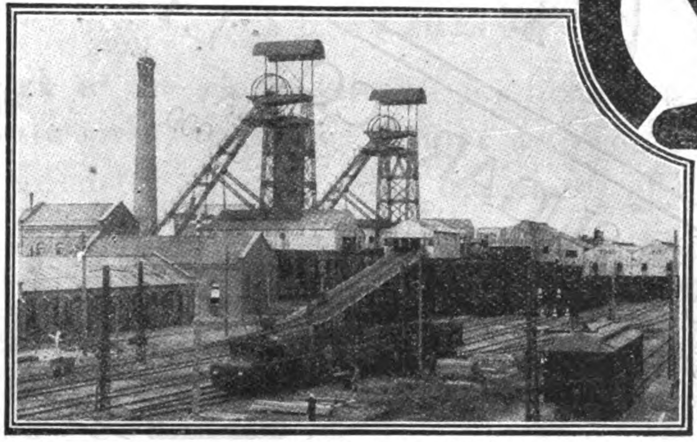
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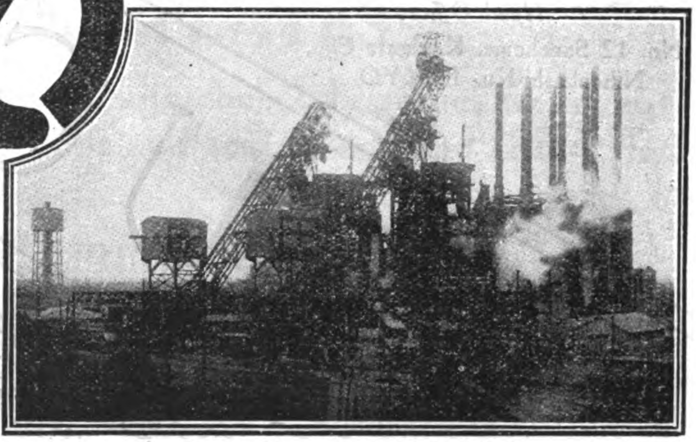
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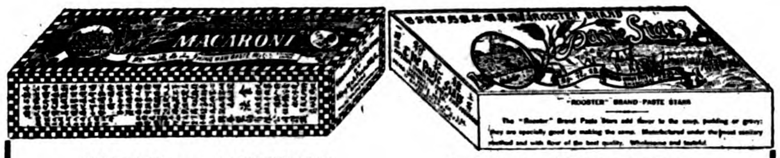

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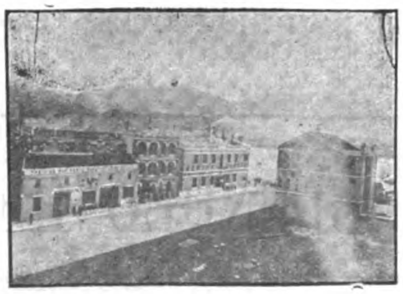

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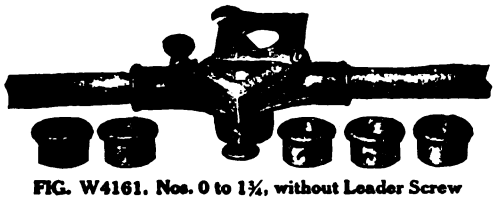

FIG. W4161. Nos. 0 to 1¼, without Leader Screw

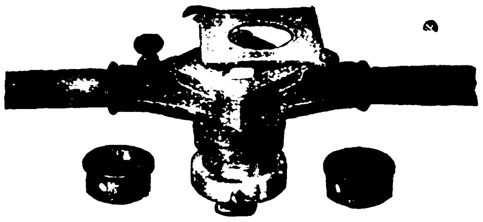

FIG. W4162. Nos. 2, 3, 4, with Leader Screw

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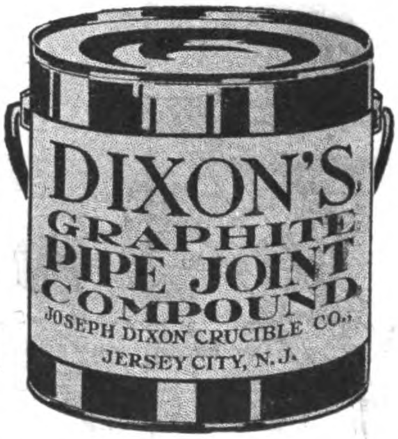

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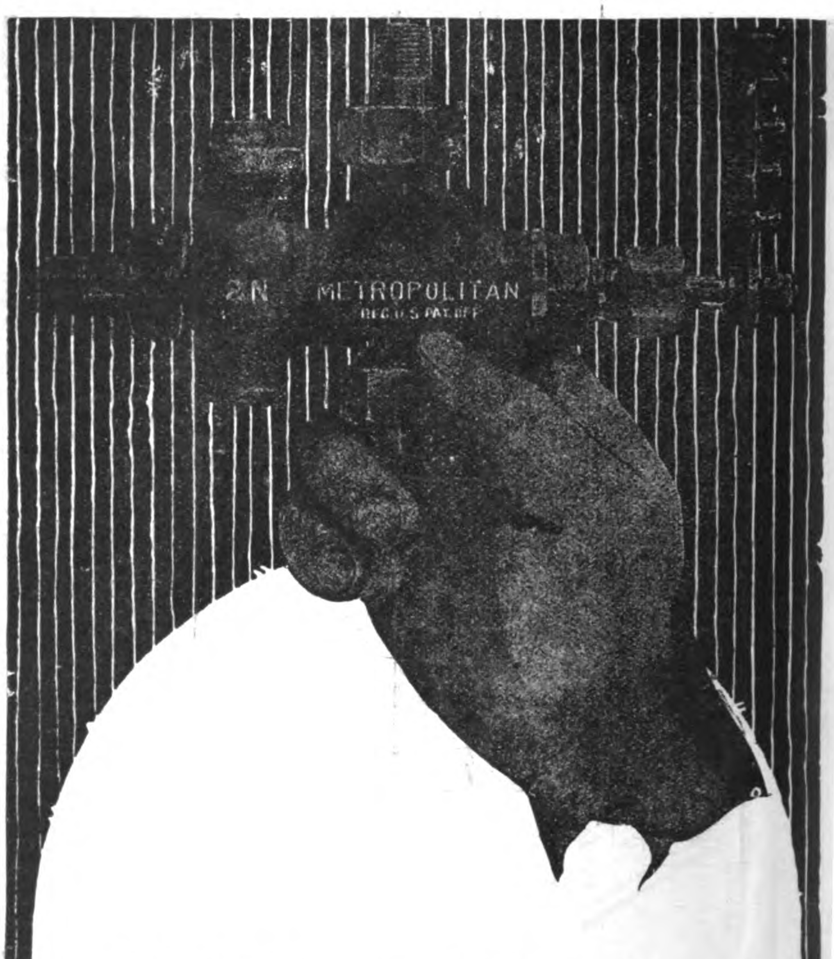

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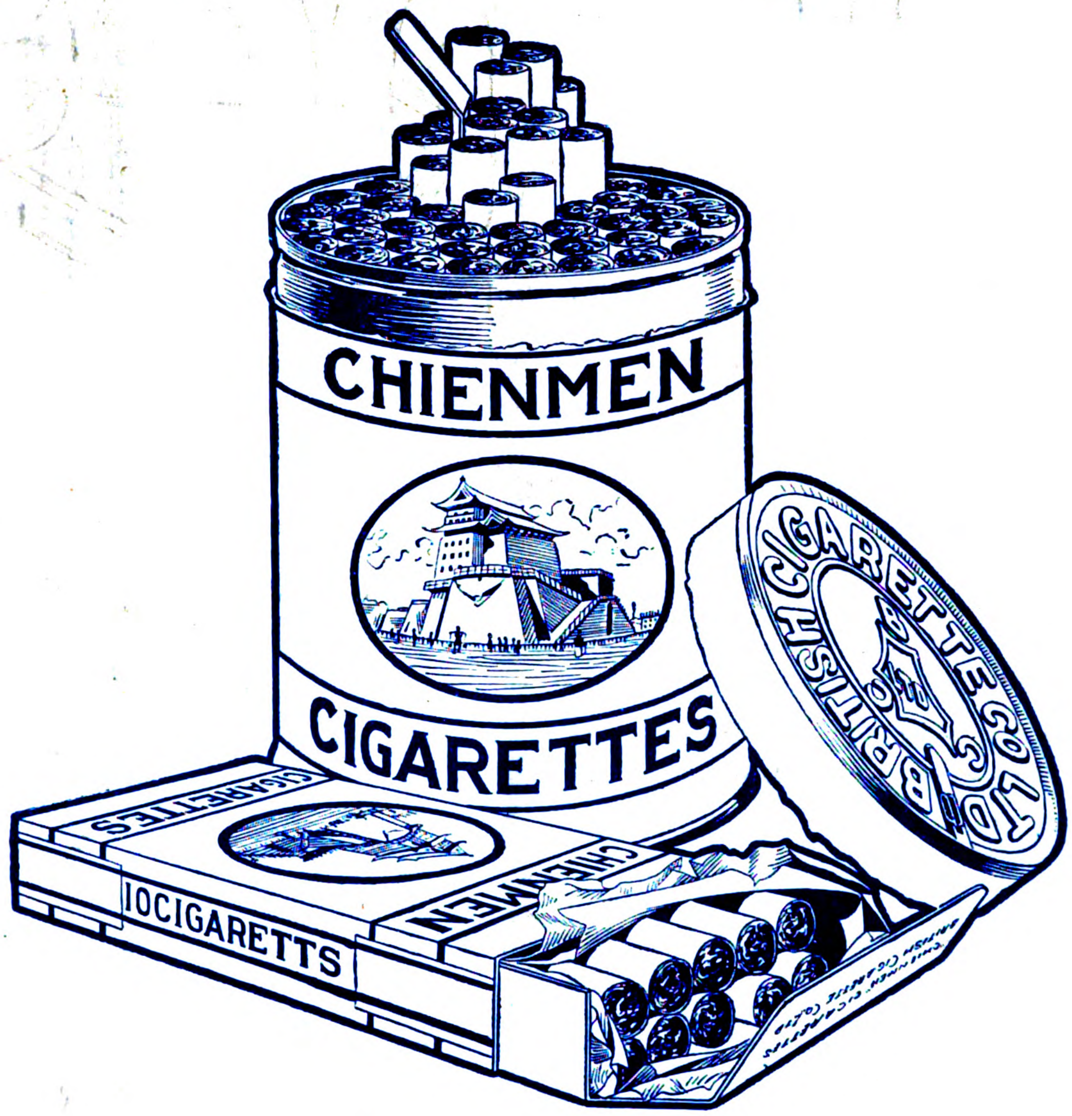

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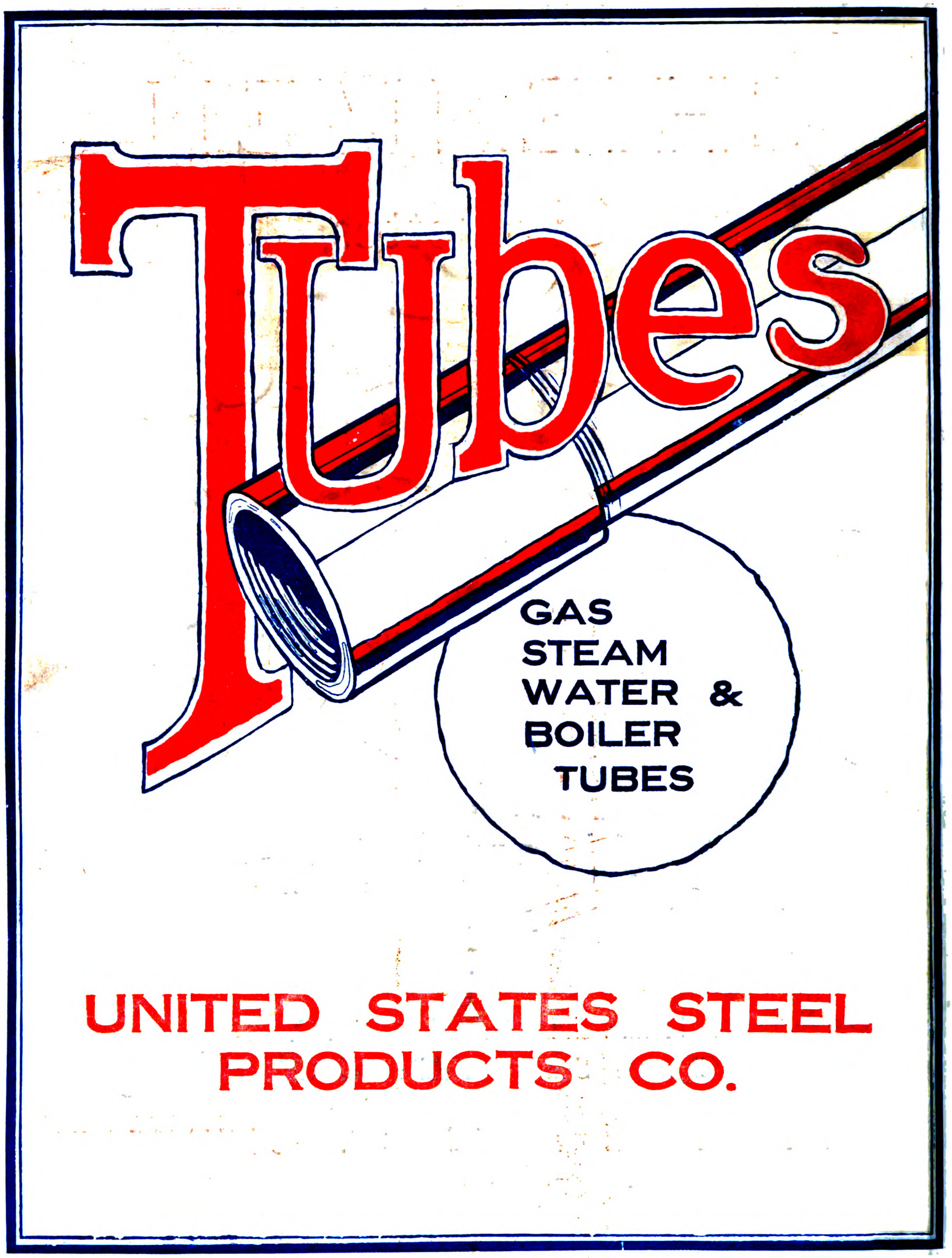

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OCTOBER, 1921

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ENGINEERING FINANCE COMMERCE

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A Model Textile Factory in China

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The Yellow River Bridge Scandal

Siam's National Highways

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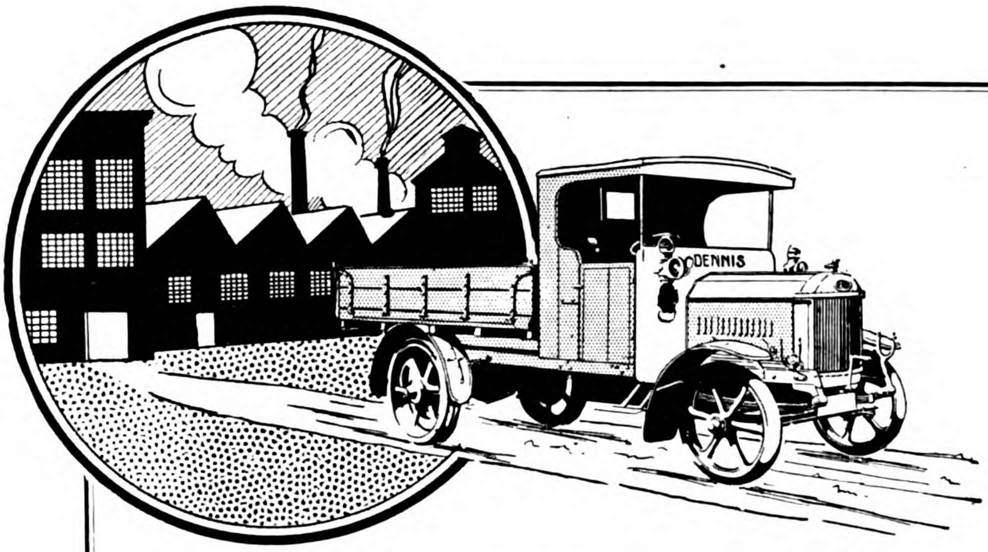

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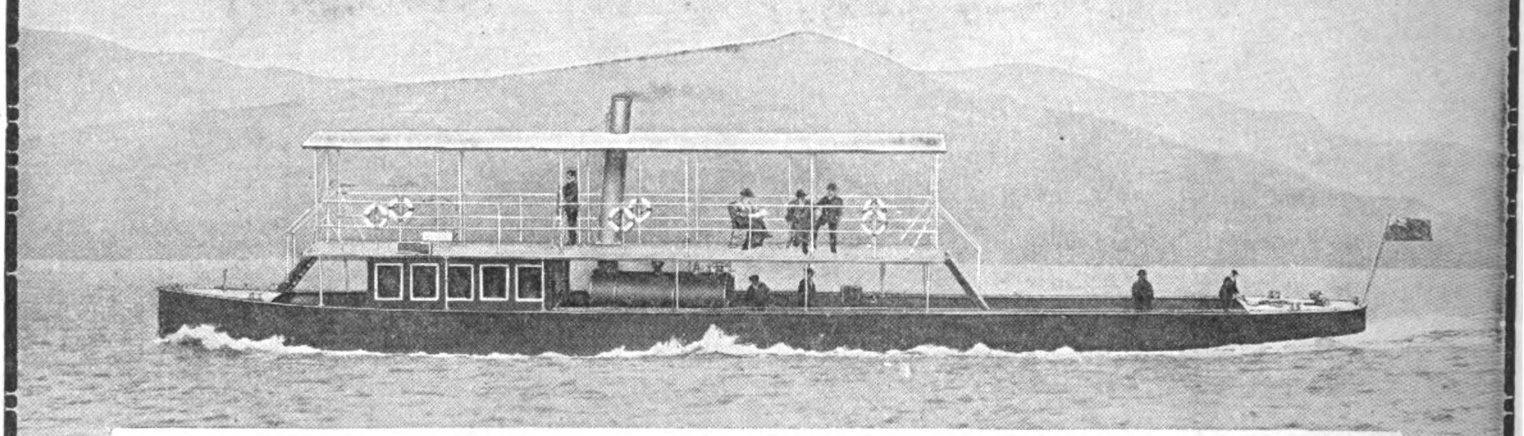

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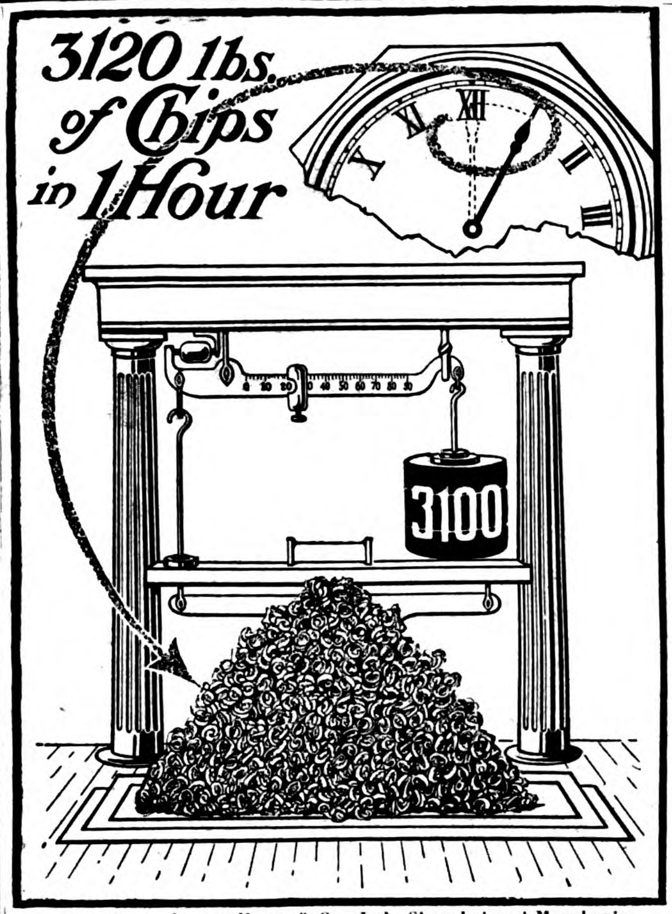

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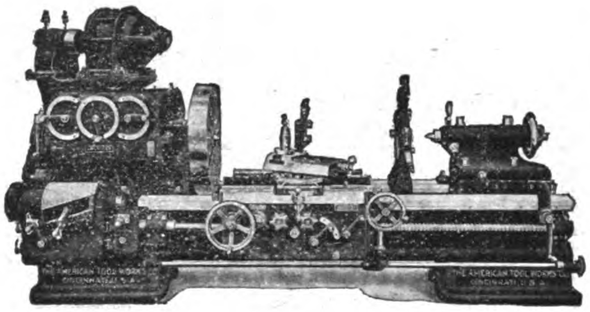

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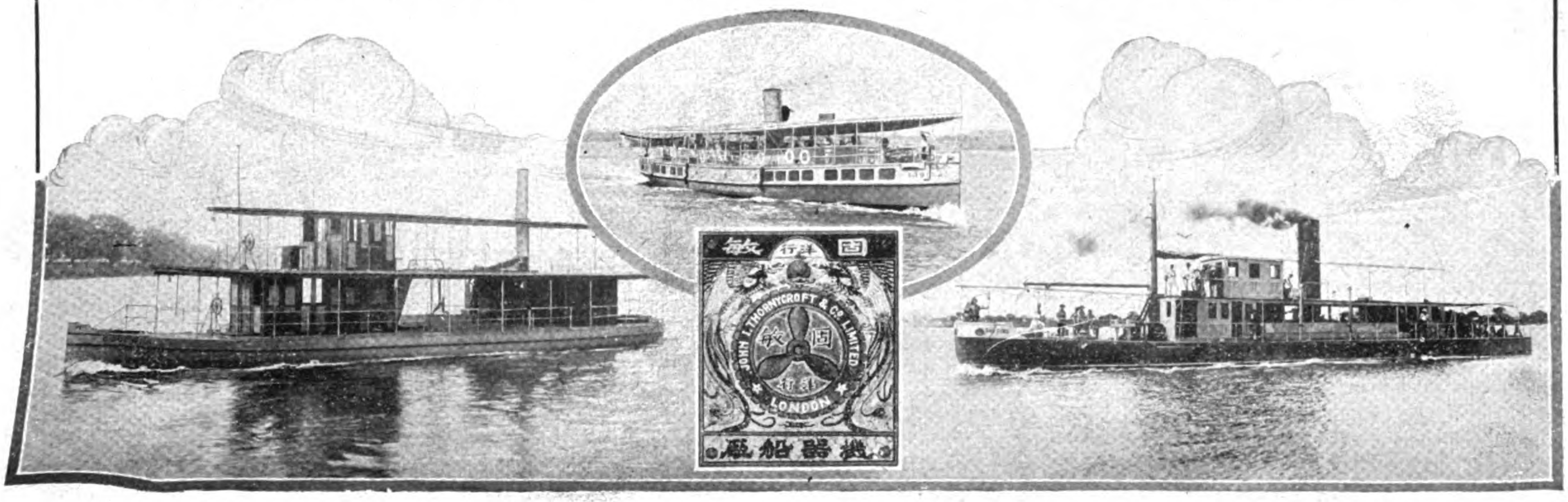

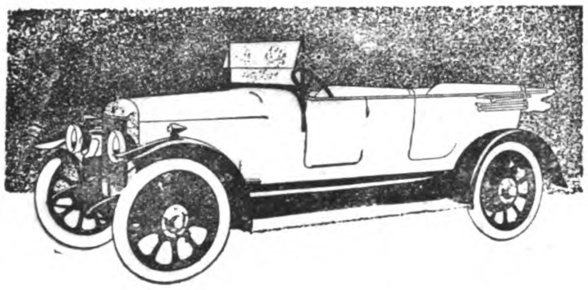

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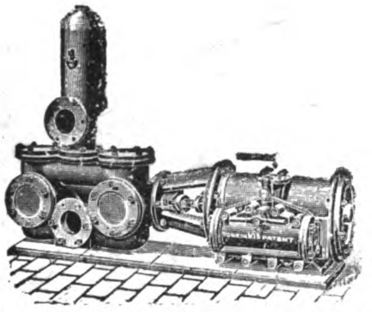
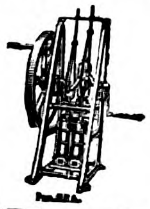
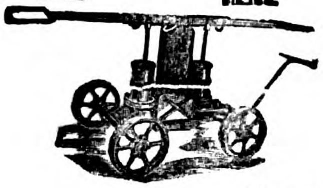
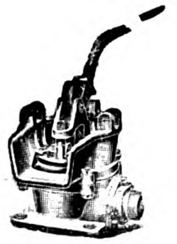
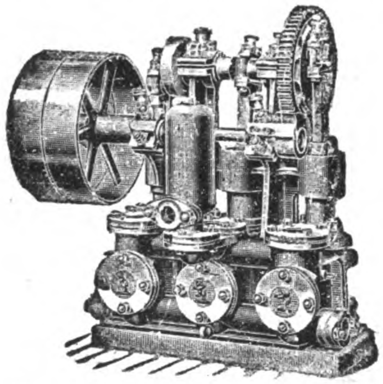


STEAM PUMP for General Purposes









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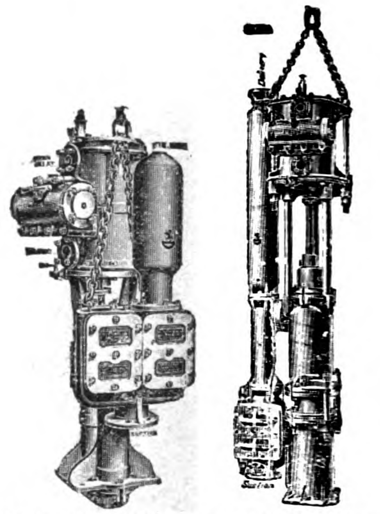

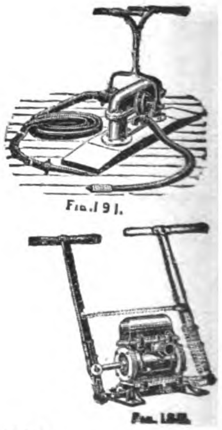

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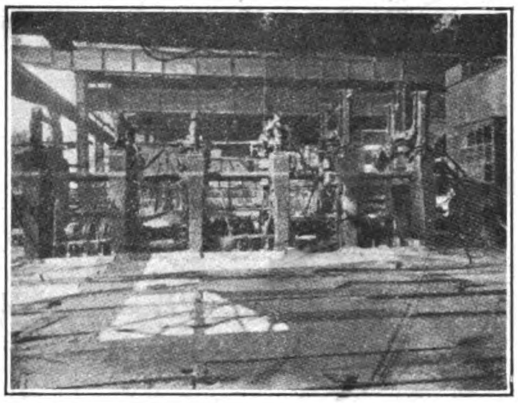

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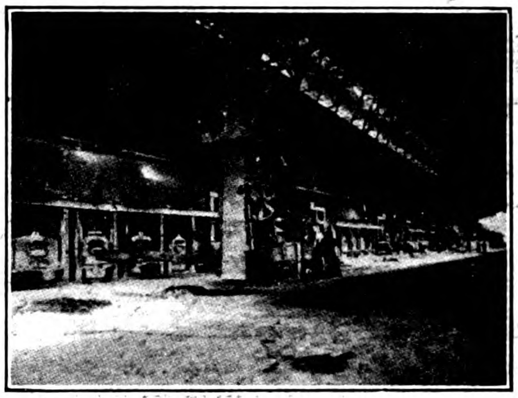

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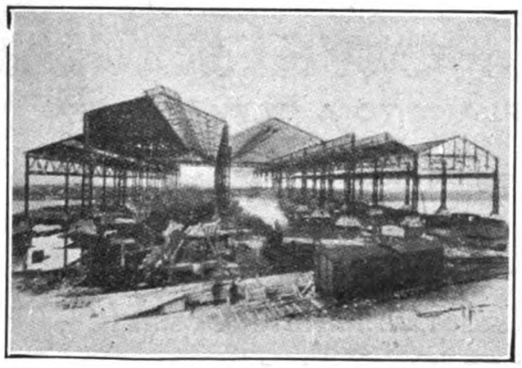

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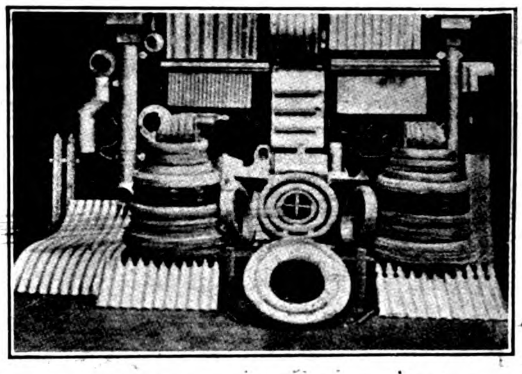

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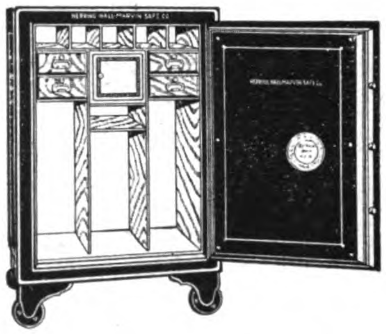

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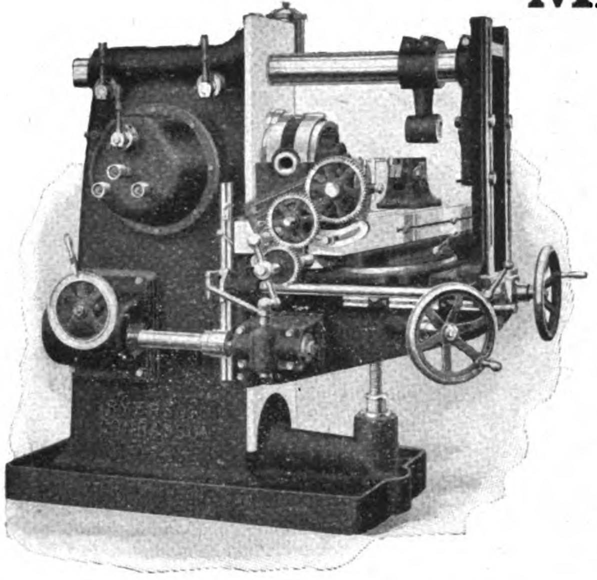

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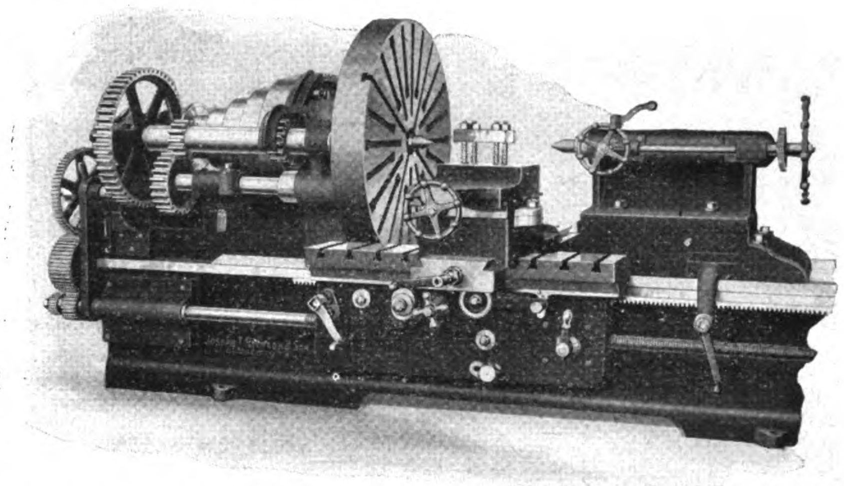

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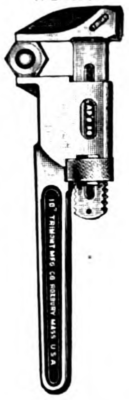

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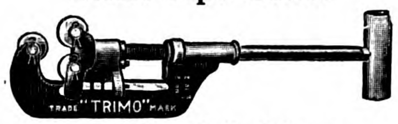

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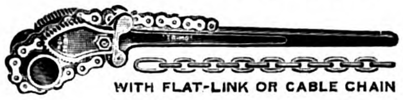

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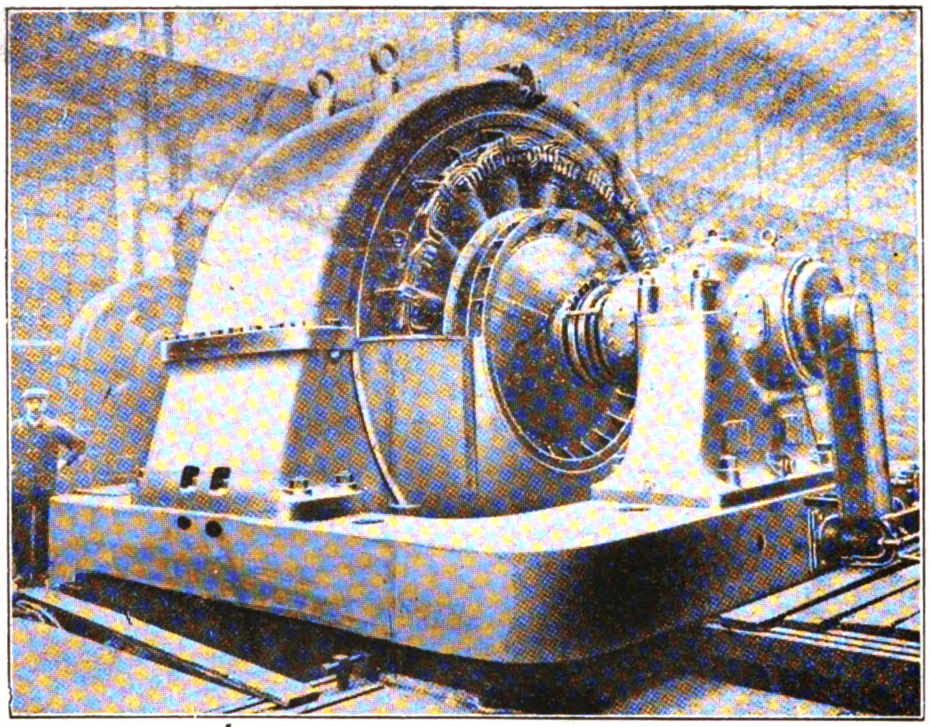

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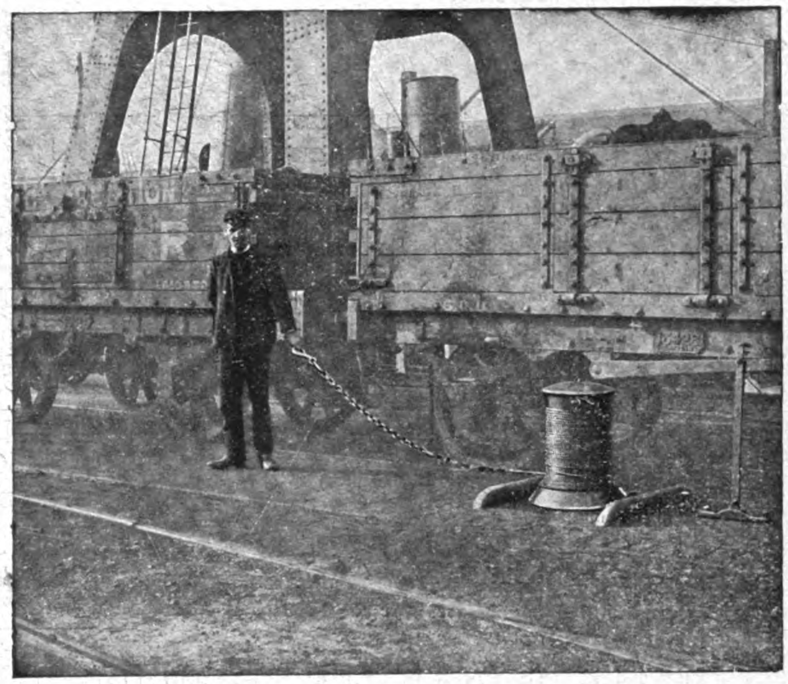

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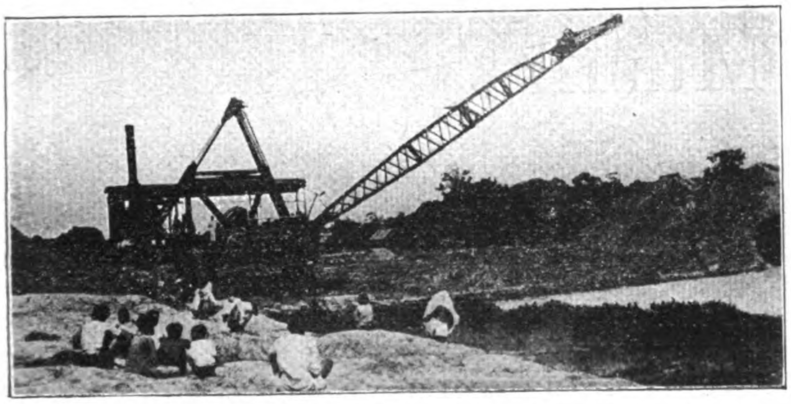

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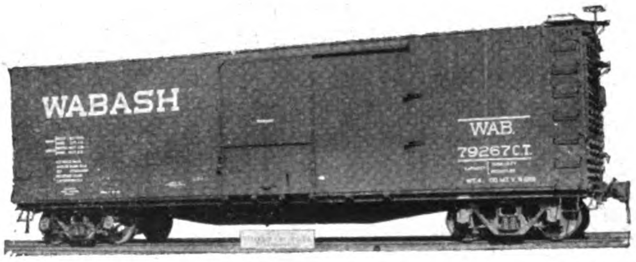

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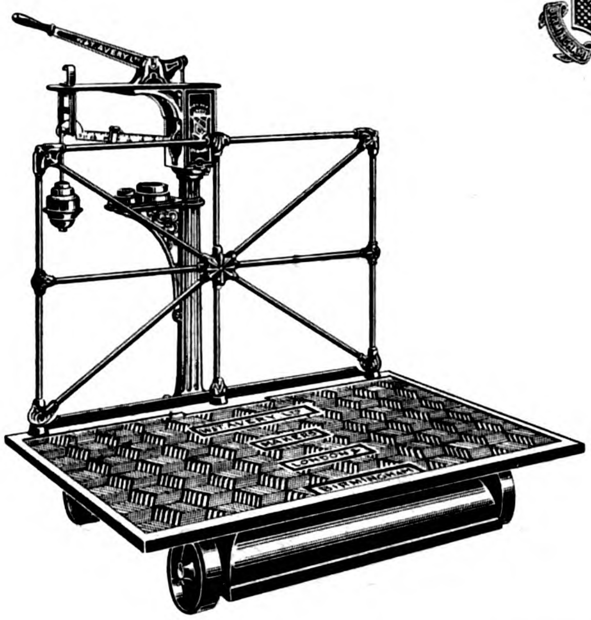

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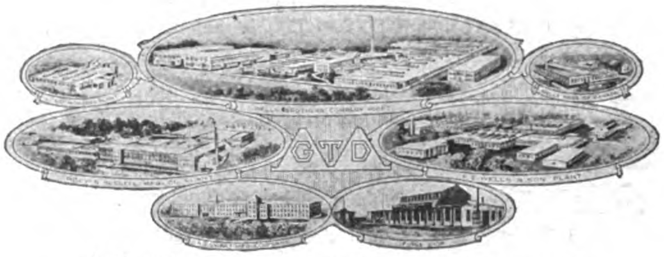

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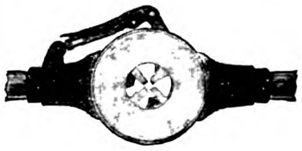

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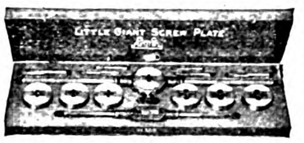

2

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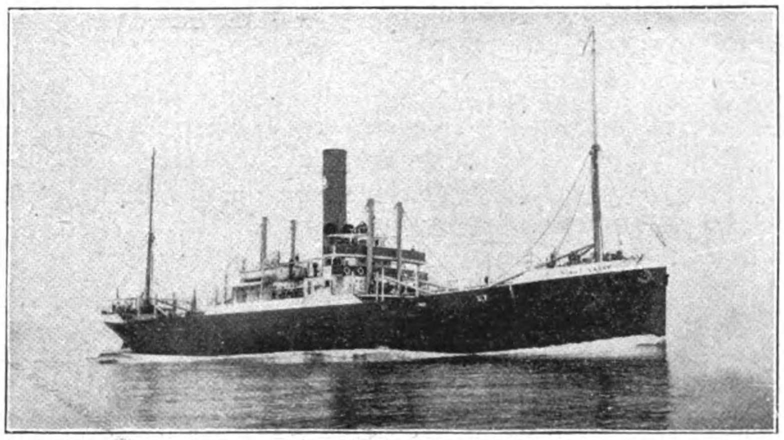

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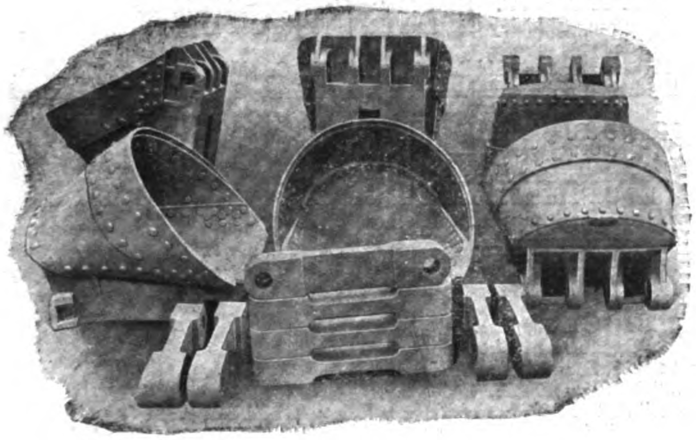

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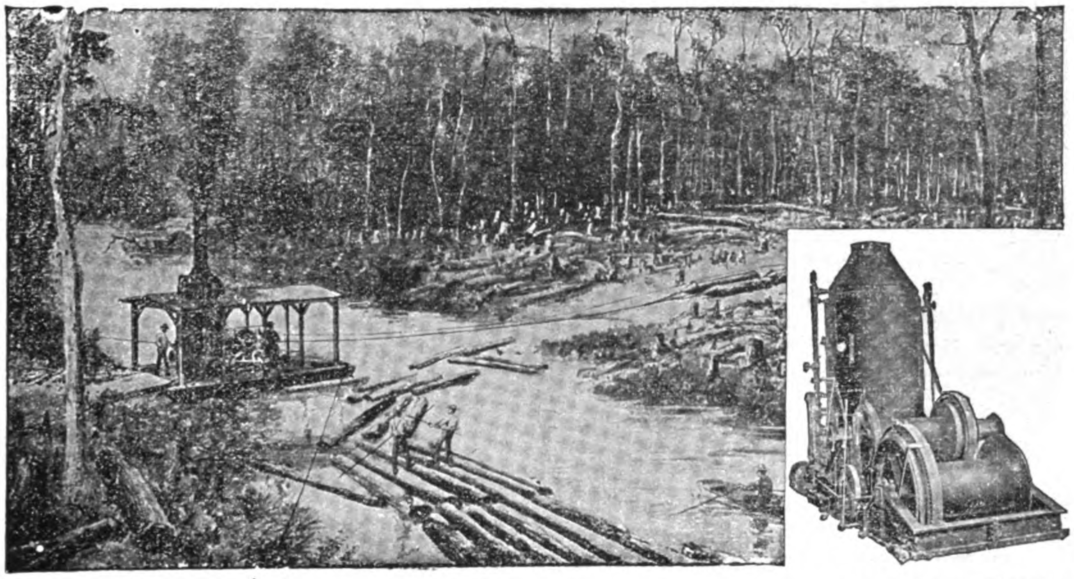

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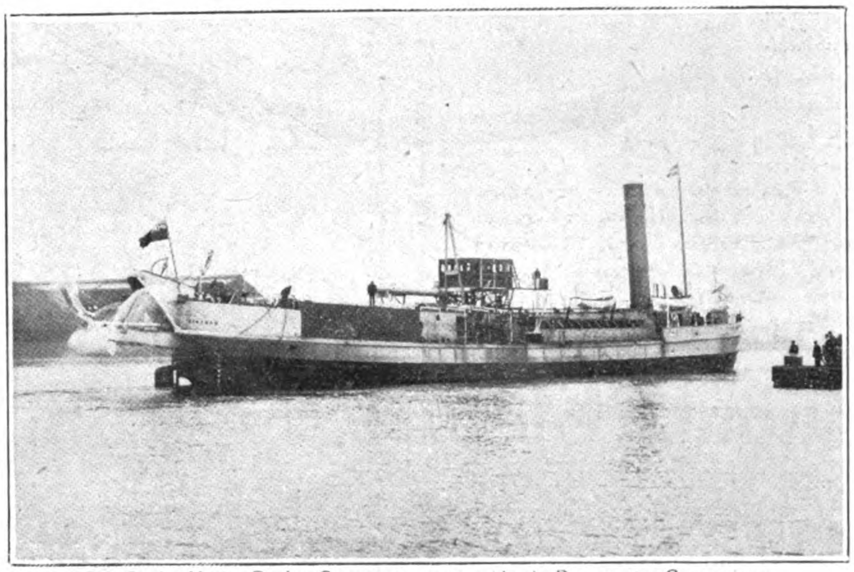

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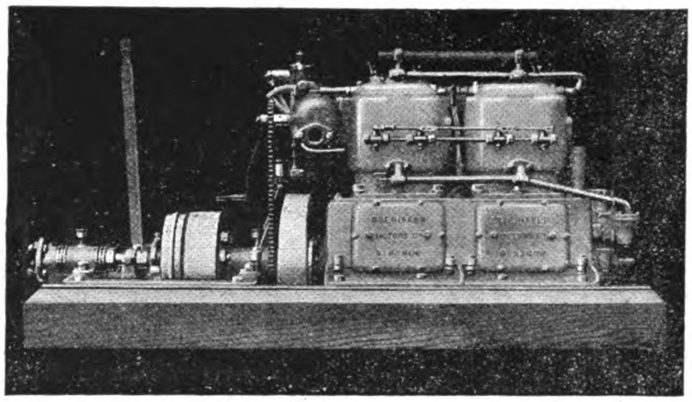

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Fencing Materials—Wire Fencing, Steel Posts
Forgings
Frogs and Switches—Steam and Electric Railways
Hoops and Bands
Machine Forgings
Mine Timbers
Nails and Spikes
Nail Wire
Pig Iron
Piling—Steel Sheet
Pipe—Black and Galvanized Wrought, for Steam, Gas and Water: American or English Lapwelded Boiler Tubes. Matheson Lead Joint Pipe. Seamless Steel Tubing
Plates—Boiler, Tank, Ship, Flange and Fire Box Steel
Poles—Steel Tubular
Rails—Light and Heavy Rails for Railways, Tramways, Mine and Industrial Railways. Special Track Work
Reinforcement for Concrete—Triangle Wire Mesh
Rivets
Rope—Wire for Mine Hoists, Derricks, Cranes, etc.
Screw Spikes
Screw Stock—Cold Drawn
Shafting
Shapes—Standard Structural
Sheet Bars
Sheets—"Apollo" Brand, Plain, Galvanized, Corrugated, Black
Skelp
Slabs
Spikes—Railway Track Spikes
Sleepers—Steel
Spring Steel
Steam Pipe and Tubes
Stove Pipe Skeebs
Switchs—Switch Stands
Tank Plates
Terne Plates
Tin Mill Products
Tin Plate—"Coke," "Charcoal" and "Terne"
Tool Steel
Towers—Steel
Triangle Mesh Concrete Reinforcement
Tubes—Gas, Water, Steam
Turntables for Light and Heavy Railway Service
Upholstery Springs
Washers
Weatherproof Insulated Telephone and Signal Wire
Wheels—Solid Wrought Steel for Steam, Electric, Mine and Industrial Railways
Wire Products—Plain, Galvanized, Bright Hard, Bright Soft, Baling and Fencing. All Classes of Coated and Uncoated for Manufacturing Purposes

The Combined Actual Annual Ingot Production of our Manufacturing Companies for the year 1920 was in excess of 19,000,000 tons.

SHANGHAI OFFICE
Union Building—The Bund and Canton Road

TOKYO OFFICE
No. 15 Nakadori, Marunouchi

OKURA & CO. (TRADING) LTD.

No. 2 Canton Road, Shanghai

President :
Baron K. Okura

BRANCHES at Hakodate, Yokosuka, Yokohama, Osaka, Kobe, Maizuru, Kure, Moji, Saseho, Keelung, Taihoku, Seoul, Antung, Penhsihu, Mukden, Tientsin, Peking, Hankow, Changsha, Kiukiang, Tsingtau, Hongkong, Vladivostok, Sydney, San Francisco, New York, London.

Head Office :
Ginza, Tokio

GENERAL IMPORTERS AND EXPORTERS

Agents for

Akita Lumber Co., Ltd.
Toyo Marine Insurance Co., Ltd.
Pen-Hsi-Hu Coal and Iron Mines, Ltd.
Norwich Union Fire Insurance Society, Ltd.
Nippon Conscription and Survivorship Insurance Co., Ltd.
Chiyoda Mutual Life Assurance Co., Ltd.
Niitaka Sugar Refining Co., Ltd.
Nippon Tannery Co., Ltd.
Nippon Buttery Co., Ltd.
Yalu Lumber Co., Ltd.

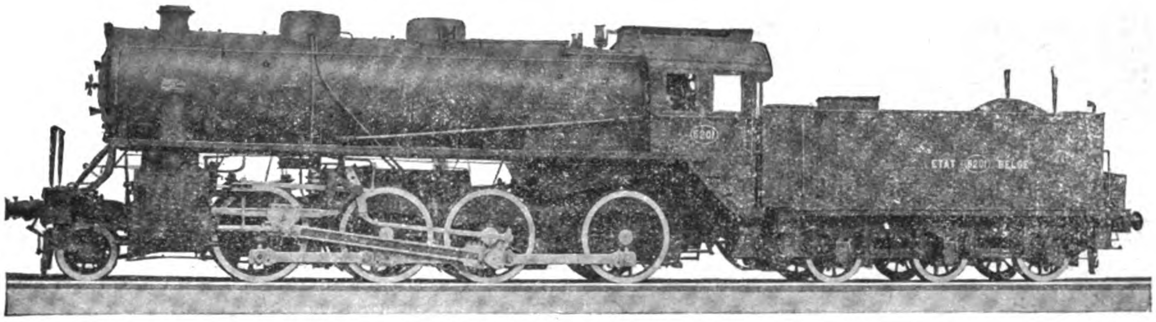
IMPORTS AND EXPORTS

PIECE GOODS, SUGAR, ELECTRIC FITTINGS, COTTON, MACHINERY, MARINE PRODUCTS, FERTILIZERS, CEREALS AND PULSE, COAL, CHEMICALS, HIDES, FLOUR, TIMBER, YARN, METALS. OILS. WOOL, ORES, PIG IRON, ETC.

Yih Chong Wharf (Okura)

POOTUNG, SHANGHAI

AN UNUSUAL TRIBUTE



BUILT FOR THE BELGIAN GOVERNMENT

Total Weight of Engine, 188,000 pounds; Weight on Driving Wheels, 167,000 pounds; Diameter of Driving Wheels, $59\frac{7}{8}$ inches; Boiler Pressure, 200 pounds; Cylinders, 24 × 28 inches; Maximum Tractive Power, 35,000 pounds.

An unusual tribute to the locomotives supplied to the Belgian Government by the United States builders recently appeared in the Belgian official publication—"Chronique des Travaux Publics."

The following are extracts from this article :—

"The American locomotives measure up to the most optimistic expectations, inasmuch as we are using them on the Luxembourg line, the hardest division of our railways—and all are giving the best of service.

"The good quality of the American engine is proved by the significant fact that they are used in passenger service.

"The most important part of the locomotive—the boiler—is perfect.

"In a word, the American locomotives are giving entire satisfaction. They conform to the technical requirements imposed and they have to-day already given considerable service."

AMERICAN LOCOMOTIVE SALES CORPORATION

Export Sales Agents for

AMERICAN LOCOMOTIVE COMPANY

AND

MONTREAL LOCOMOTIVE WORKS, LIMITED

30 CHURCH STREET, NEW YORK, U. S. A.

CABLE ADDRESS: "LOCOMOTIVE," NEW YORK

RESIDENT TECHNICAL REPRESENTATIVE

CHINA: PEKING—F. M. Titus, International Banking Corporation

MITSUI BUSSAN KAISHA

Cable Address: "MITSUI"

LIMITED

Capital: Yen 100,000,000
Reserve: „ 30,000,000

MITSUI & CO., LTD. (IN EUROPE AND AMERICA)

IMPORTERS AND EXPORTERS

SHIPOWNERS AND SHIPBUILDERS

Head Office: TOKYO, JAPAN

Branches:

HOME—Yokohama, Nagoya, Osaka, Kobe, Otaru, Muroran, Hakodate, Niigata, Moji, Wakamatsu, Kuchinotsu, Nagasaki, Karatsu, Miike, Taipeh, Keelung, Tainan, Takow, etc., etc.

ABROAD—London, Marseilles, Lyon, Hamburg, New York, San Francisco, Seattle, Portland, Ore, Buenos-Aires, Manila, Bombay, Karachi, Calcutta, Singapore, Bangkok, Rangoon, Soerabaya, Batavia, Semarang, Sydney, Melbourne, Hongkong, Canton, Amoy, Foochow, Shanghai, Chefoo, Hankow, Changsha, Newchwang, Tientsin, Dairen, Antunghsien, Mukden, Tieling, Chungchun, Vladivostok, Harbin, Seoul, Chemulpo, Fusan, etc , etc.

SHIPBUILDERS, ENGINEERS AND REPAIRERS SHIPYARDS AND DRYDOCKS AT TAMA, OKAYMA, JAPAN, For Construction and Repairing

PRINCIPAL LINES OF BUSINESS:

EXPORT.

Raw Silk and Silk Textiles, Coal, Lumber, Rice, Seeds, Beans, Flour, and Other Cereals, Sugar, Copper and other Metals, Vegetable and Wood Oils, Camphor, Matches, Fertilizers, Paper, Canned Foods, Fish Products, Tea, Sulphur, Cement, etc , etc.

IMPORT.

Machinery and Tools, Ships, Steel and Iron, Locomotives, Rails and other R. R. Equipment, Sugar, Rice, Wool, Phosphate, Sulphate of Ammonia, Nitrate of Soda, Rubber, Dyes, Drugs and Chemicals, Jute and Gunnies, Flax and Hemp, Wheat, Seeds, and other Cereals, Bean Cakes, Lumber, etc., etc.

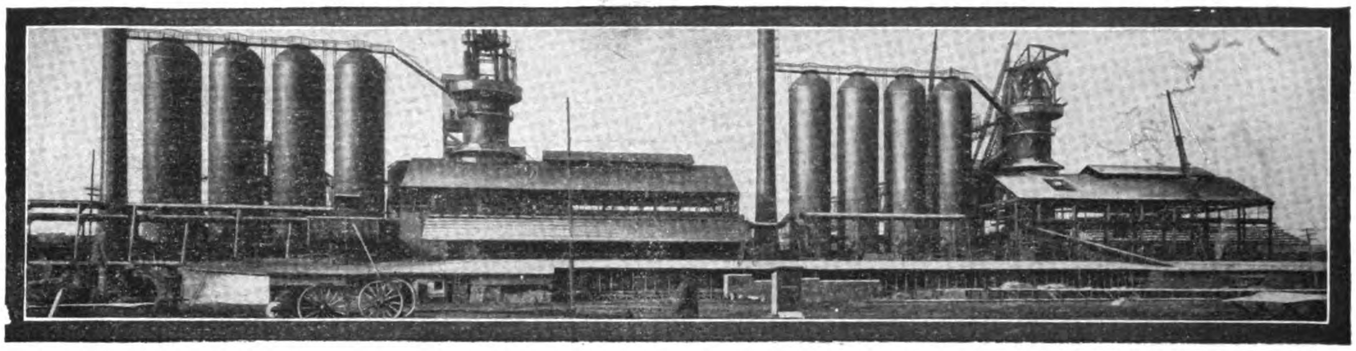
ENGINEERING DEPARTMENT

Sole Agents for Leading American and European Makers, including

American Locomotive Co.
Bucyrus Co.
California National Supply Co.
De La Vergne Machine Co.
General Electric Co.
General Motors Export Co.
Manning Maxwell & Moore, Inc.

Mesta Machine Co.
Nordberg Manufacturing Co.
Sullivan Machinery Co.
Belliss & Morcom, Ltd.
Geo. Cradock & Co., Ltd.
Platt Brothers & Co., Ltd.
Ruston & Hornsby, Ltd., etc. etc.

Also, AGENTS IN JAPAN, ORIENT, and INDIA for Well-known Japanese Insurance Cos.



McClintic-Marshall Blast furnace plant, Ford Motor Company, Detroit, U.S.A.

The surest way to safeguard against waste in steel construction is to lay your plans before builders of mature judgment. Profit from their experience with problems similar to yours.

The McClintic-Marshall Products Company conceives and builds steel structures of every description, including industrial buildings, bridges, power plants, ships, train sheds, warehouses, etc., and its long training insures the most scientific and economical accomplishment.

We Design, Manufacture and Erect
Steel Industrial Plants
Railroad and Highway Bridges
Lock Gates
Blast Furnace Plants
Steel Storage Tanks
Riveted Steel Pipe
Steel Transmission Towers
Steel Ships and Barges
Oil Refining Plants
Gas Plants and Gas Holders
Ore Bridges
Etc.
McClintic-Marshall
Annual Capacity, 400,000 Tons

Write for free booklet No. 401

McClintic-Marshall Products Company

FACTORIES: PITTSBURGH, U. S. A.

Foreign Contract Dept., 50 Church Street, NEW YORK

Cable Address: "Macmarsh" NEW YORK

YOKOHAMA: H. E. Root, 50a Yamashita-cho 4

LONDON: 25 Victoria St., S.W. 1.

PARIS: Produits Métallurgiques McClintic-Marshall, 8 Rue Edouard VII

MADRID: Hispano-American Corporation.

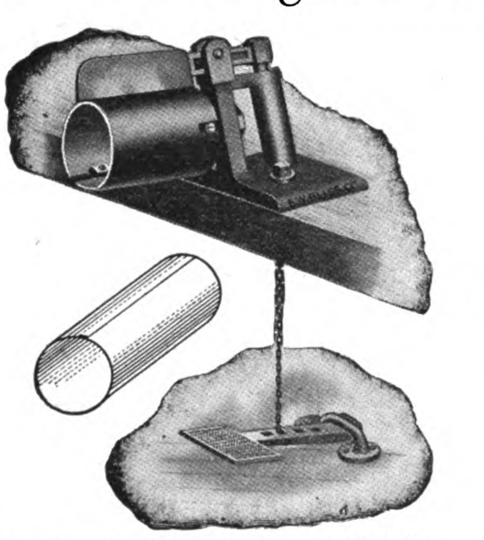
HAVANA: Obrapia e Ignacio.

McClintic-Marshall

Steel Construction

FROM THE TIN PLATE TO THE FINISHED CAN

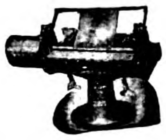
The Soldering Frame



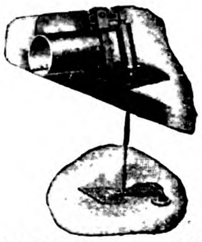
No. 10—"Bliss" Soldering Frame and Cylinder

SHEAR
This cuts the tin plate into strips.

PRESS
This blanks out tops and bottoms.



ROLL FORMER
This rolls the bodies to cylindrical shape.



SOLDERING FRAME and CYLINDER
This solders the side seams.

FLANGER
This flanges both ends of can bodies.

DOUBLE SEAMER
This attaches bottoms and tops.

After rolling the strips into cylindrical bodies (see last previous advertisement), the next operation is to solder the side-seam (machine and operation shown at left). This is done by the "BLISS" SOLDERING FRAME and CYLINDER, the most perfect soldering instrument in use for this purpose. Operated by treadle and hinged knife, prefect adjustment is assured.

Do not overlook this series of advertisements, and, especially, watch for the next advertisement which will illustrate the fifth operation.

"Bliss" Can Making Machinery (one series shown at right) is suitable for making cans of all kinds and tin packages for every purpose. **With your inquiries always send samples and state daily output desired.**

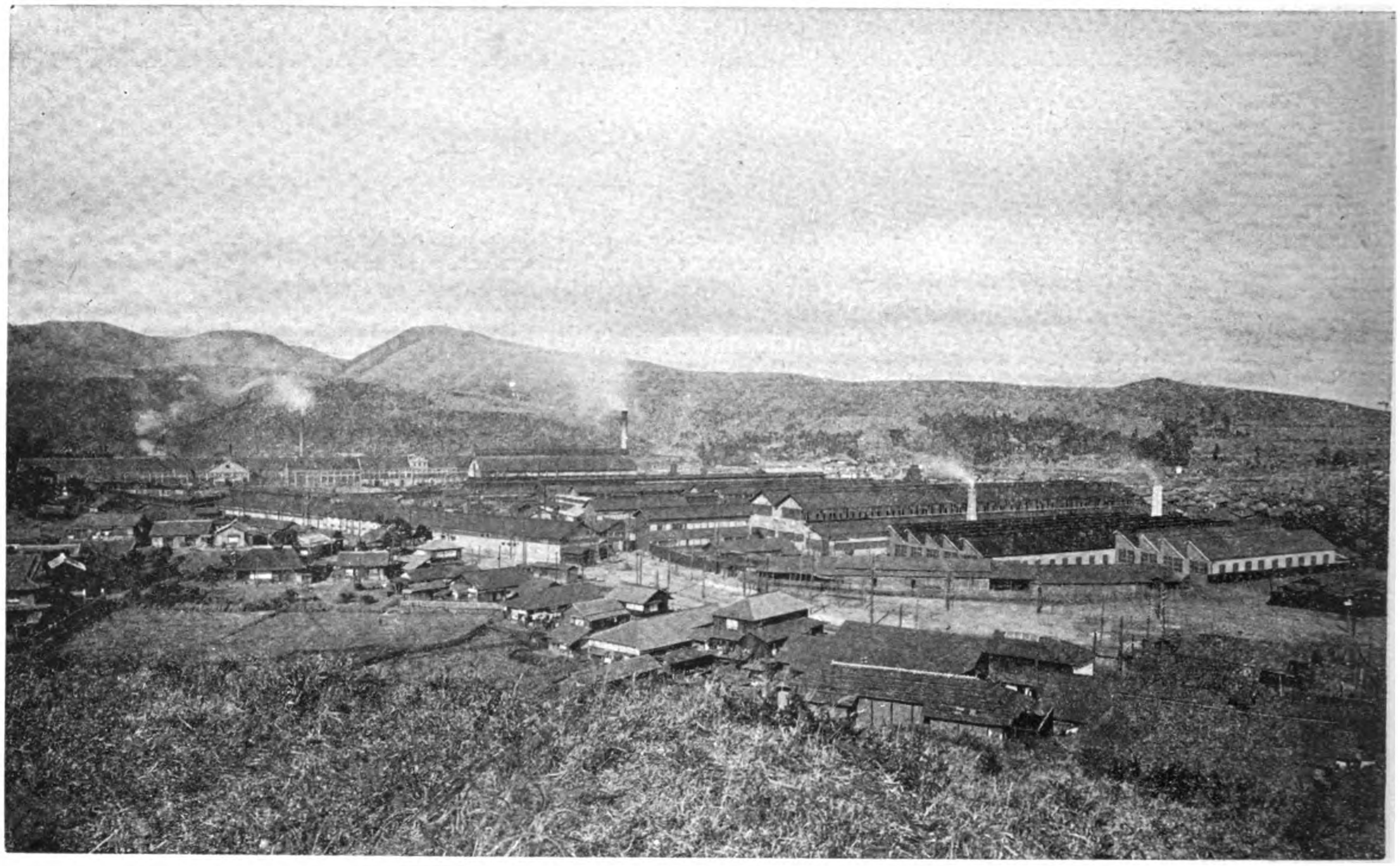
E. W. BLISS COMPANY

22 JOHN ST., BROOKLYN, N.Y., U.S.A.

Presses, Dies and Machinery for the Sheet Metal Industry in general. Complete plants for the manufacture of Metal Boxes, Sanitary Cans of all shapes and sizes, Kitchen Utensils, Petroleum Cans, etc. Complete automatic equipment for making tin cans from tin plate in one continuous operation.

London, England—Pocock St., Blackfriars Road **Paris, France—100 Boulevard Victor Hugo, St. Ouen**

HIDACHI ENGINEERING WORKS



GENERAL VIEW OF HIDACHI ENGINEERING WORKS

Location of Plant:

SUKEGAWA, IBARAKI PREFECTURE, JAPAN.

Sales Departments:

KUHARA MINING COMPANY OFFICES, 1 ITCHOME, YAESUCHO, KOJIMACHI-KU, TOKYO.

KUHARA MINING COMPANY OFFICES, 90 NICHOME, KITAHAMA, HIGASHI-KU, OSAKA.

Articles Manufactured:

DYNAMOS, ELECTRIC MOTORS, TRANSFORMERS, DISTRIBUTOR PLATES, TURBINE PUMPS, CRANES, WINCHES, AND VARIOUS KINDS OF HYDRAULIC WHEELS.

Also Agents for Hoden Oil, Used for Transformers.

STEAM CRANE EXCAVATORS
with quadrant gear for manipulating Bucket Arm

Prompt Attention given to all Orders.

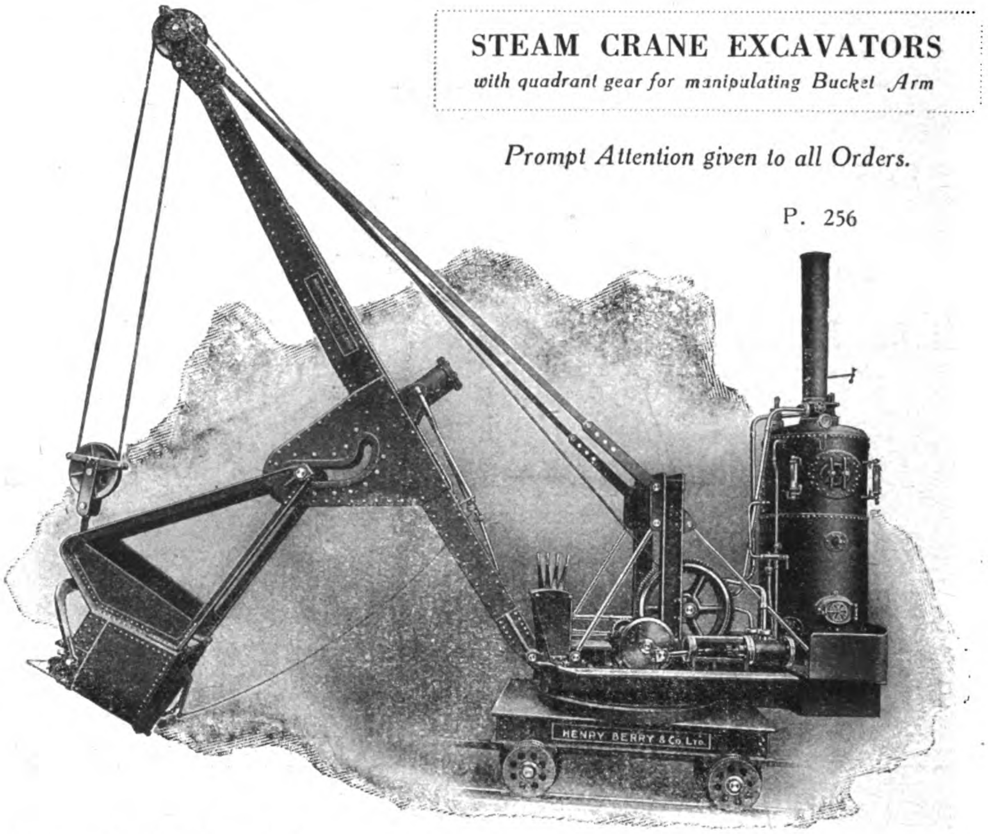
P. 256

Quick Work

This is one of the Berry

8-TON

Steam Driven EXCAVATORS



with a working output per ten hour day of 420 cubic yards in hard clay or 850 in sand. Invaluable for every kind of Mining, Canal and Railway Building Work.

We also supply Shipyards, Boilermakers and Steel Works with Plant of all Kinds.

London Office: 38 Victoria Street, Westminster, S.W. 1.
Indian Agents: Messrs. Burn & Company, Calcutta.

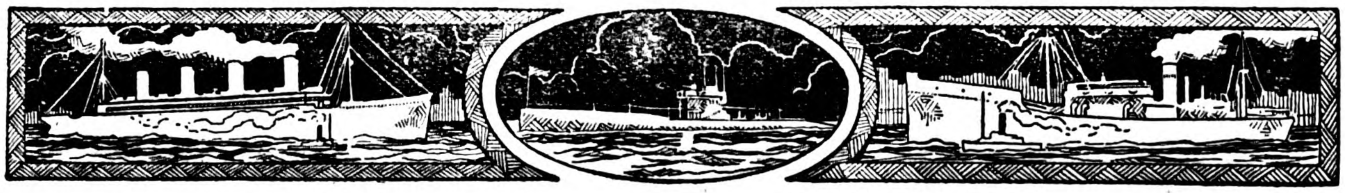
HENRY BERRY & Company Limited.

HYDRAULIC ENGINEERING SPECIALISTS

Codes: A. 1. 5th Edition A.B.C. Engineering

LEEDS, ENGLAND

Codes: Everybody's Pocket Code Marconi International



THE
HONGKONG & WHAMPOA DOCK CO.
LIMITED,

HONGKONG

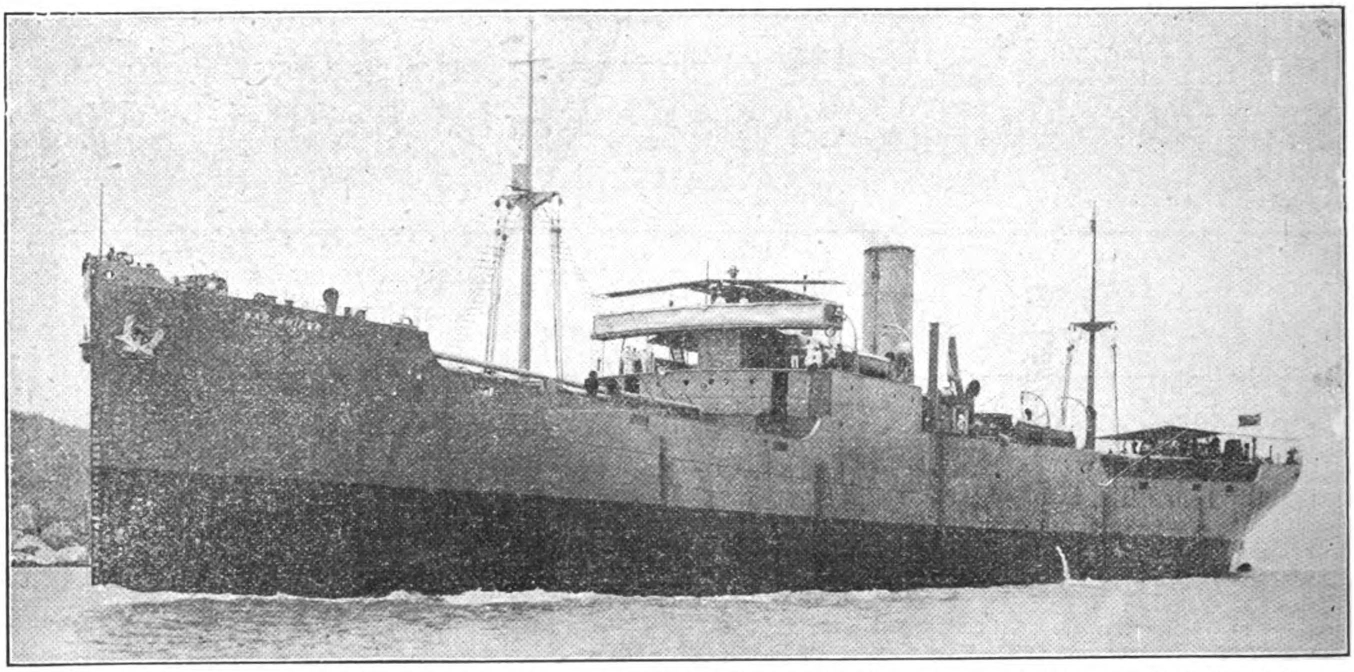
BUILDERS AND REPAIRERS OF SHIPS AND ENGINES OF ALL KINDS

and Makers of

BOILERS, IRON and BRASS CASTINGS, FORGINGS and CONSTRUCTIONAL IRON WORK, RAILWAY ROLLING STOCK, Etc.

Dock Owners, Ship Builders, Marine and Land Engineers, Boiler Makers, Iron and Brass Founders, Forge Masters, Electricians

The Company possesses Six Granite Docks and Two Patent Slipways and these are Equipped for Expeditious Work. The Plant is of the most modern type throughout. Ship Owners and Captains are assured that Docking and Repairs are carried out Promptly and at Moderate Charges.



S.S. "*WAR SNIPER*," 8,200 tons d.w.—5,175 tons gross. Built and engined by The Hongkong & Whampoa Dock Co., Ltd. to the order of the British Government.

Address Enquiries to the Chief Manager, R. M. DYER, B.Sc., M.I.N.A., Kowloon Docks, Hongkong

HEAD OFFICE: KOWLOON
TELEPHONE No. 55 K.

TOWN OFFICE: QUEEN'S BUILDINGS
TELEPHONE No. 20 HONGKONG

TELEGRAPHIC ADDRESS: "MANIFESTO" HONGKONG

Codes Used: A1; A.B.C., Fifth Edition; Engineering, First and Second Editions; Western Union and Watkins

MACHINE TOOLS

With Steel Plate or Cast Iron Frames

Agents for China:—

The Anglo-Chinese Engineers' Association, Ltd.

in Association with Reiss & Co.

Address:—

Ice House St., Hongkong

7 Hankow Rd., Shanghai

Liddell Buildings, Yaku Road, Tientsin.

52 Dar Farng Chia Hutung, Peking.

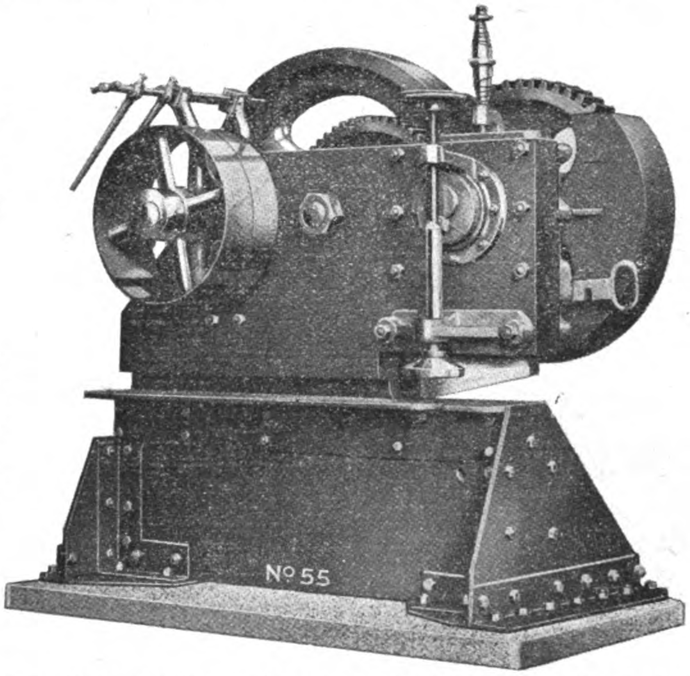


Plate Splitting Machine. For plates of unlimited length and width.

Punching and Shearing Machines.

Plate Bending Machines.

Plate Straightening Machines.

Plate Edge Planing Machines.

Plate Shearing Machines.

Steam Bending and Straightening Machines.

Bar Cropping Machines.

Multiple Punching Machines.

etc. etc.

CRAIG & DONALD LIMITED

Johnstone, Nr. Glasgow, Scotland

BABCOCK & WILCOX, LTD.

PATENT

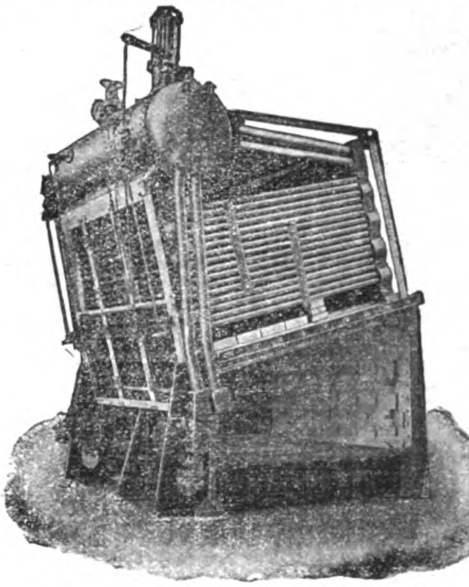
WATER-TUBE STEAM BOILERS

SUITABLE FOR ALL INDUSTRIES, AND FOR BURNING ANY KIND OF FUEL

13,400,000 H.P. Land-type For Stationary Purposes—**6,400,000 H.P.** Marine-type Afloat

MANUFACTURERS OF

SUPERHEATERS
FEED-WATER HEATERS
ECONOMISERS
STEAM PIPING
STRUCTURAL STEEL WORK
MECHANICAL STOKERS
STEEL CHIMNEYS
WATER SOFTENERS AND PURIFIERS
COAL-CONVEYING MACHINERY
SUCTION ASH PLANTS
ELECTRIC CRANES
GENERAL BOILER HOUSE ACCESSORIES



Babcock & Wilcox Marine Boiler

THE

BABCOCK & WILCOX

PATENT

MARINE-TYPE BOILER

as used in Battleships and Cruisers of the British, American, Danish, Italian, Spanish, Brazilian, and Argentine Navies, and in Vessels of all Classes of the Mercantile Marine.

BABCOCK & WILCOX also Supply as Joint Manufacturers and General Licensees with J. SAMUEL WHITE & CO., LTD. the WHITE-FORSTER Boiler for Destroyers, Torpedo Boats, Pinnaces, etc.

HEAD OFFICE FOR CHINA: 1 THE BUND, SHANGHAI

" " " JAPAN: I. I-CHOME, YURAKU-CHO, KOJIMACHIKU, TOKYO.

The Shanghai Dock and Engineering Co., Ltd.

Established 1862 **(LATE S. C. FARNHAM, BOYD & CO., LTD.)**

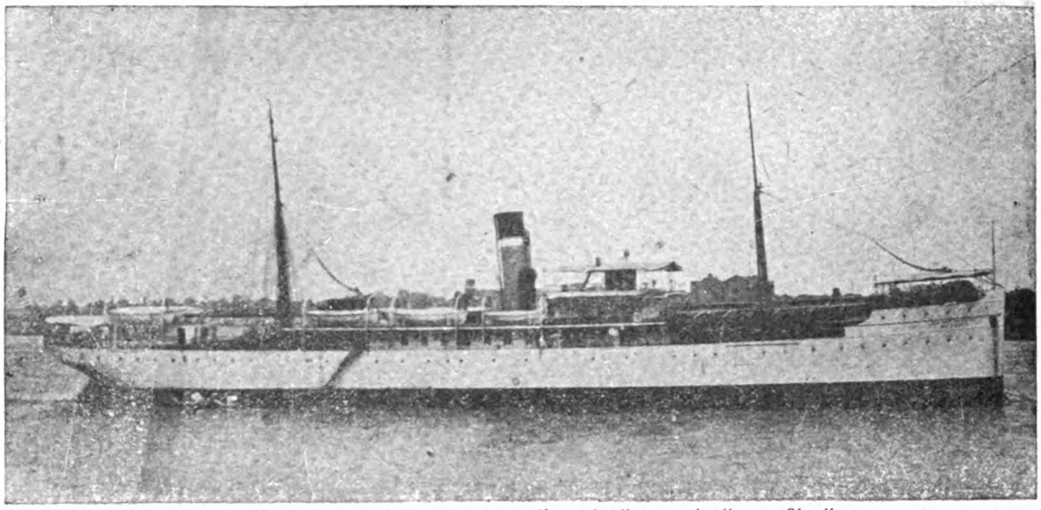
Boilermakers, Dock Proprietors, Shipbuilders, Engineers and Electricians

HEAD OFFICE:

26 Broadway,

Shanghai

Telephone No. 7



U.S. ARMY TRANSPORT "MERRITT," 300′ 0″ × 45′ 0″ × 28′ 3″

Cable Address "FARNHAM"

Codes Used, A.B.C. 4th, 5th & 6th Editions A-1, Watkin's, Scott's, Western Union, Bentley's and Engineering.

The "Merritt" is one of Twenty-Seven Steam Vessels built during the last few years to the order of The American Government for service in the Philippine Islands.

The Docks are five in number, ranging in length from 355 feet to 532 feet on the Blocks, and breadth of entrance from 53 feet to 77 feet, with a depth of water on the sill of from 16 feet to 24 feet.

The Dock charges are the most moderate in the Far East.

The Company's Yards and Docks cover 96 acres. The Water Frontage is about 1½ miles in length. Wharves and Pontoons are arranged where steamers can moor during repairs; and slips for hauling up small vessels are provided. Sheer legs capable of lifting 65 tons are placed at the various Docks.

The extensive Shipbuilding yards and workshops, lit by Electric Light, are provided with the latest improvements, such as travelling cranes of 60 tons' capacity, hydraulic and pneumatic machinery and tools.

Light railway lines are laid throughout workshops and yards.

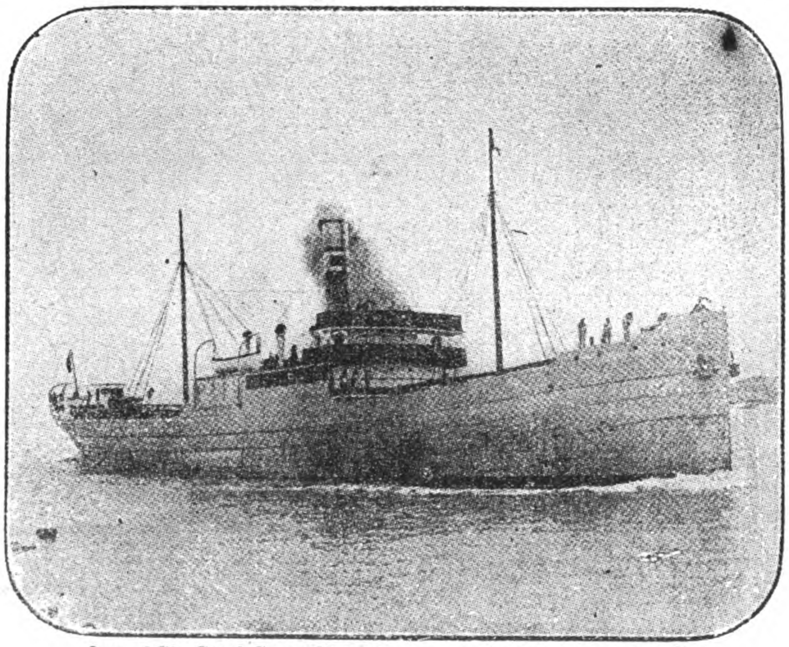
A Staff of Divers, and powerful salvage appliances, and Floating Cranes ready for any emergency at short notice. Enquiries immediately attended to.

Estimates given for all classes of work: Coast Steamers, Side and Stern Wheelers, Tugboats, Launches, Steam Barges, Dredgers, Floating Cranes, and Lighters a speciality.

Every description of repairs and renewal work undertaken and expeditiously executed.

Motor, Land and Marine Engines and Boilers, Centrifugal, Mining, and other pumping machinery always in stock or in progress, also power driven Machine Tools. Engineer's Hand Tools, Steam, Gas, Oil, and Electric machinery and Engineering accessories generally.

Low Pressure Hot Water and Steam Heating Installations



One of Six Steel Cargo Steamers presently under construction.

CALL FLAG FOR VESSELS IN SHANGHAI HARBOUR
"F.B." INTERNATIONAL CODE

PARTICULARS OF DRY DOCKS

Names	Length on Blocks	High Water	
		Breadth of Entrance	Depth of water on Sill
Cosmopolitan Dock ...	532 feet	77 feet	24 feet
International Dock ...	528 ,,	77 ,,	23 ,,
New Dock	450 ,,	74 ,,	21 ,,
Old Dock	399 ,,	53 ,,	16 ,,
Tunkadoo Dock ...	350 ,,	67 ,,	16 ,,

Berths for Building Steamers up to 10,000 tons Deadweight Capacity.

Representatives and workmen attend vessels at Woosung and outports on request.

☛ Telegraphic and Wireless Instructions from vessels promptly attended to

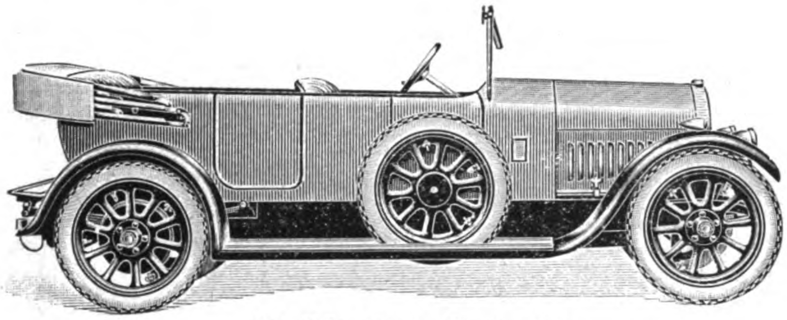
ENQUIRIES SOLICITED

Humber CARS

The more critical you are in the choice of a car, the more will HUMBER quality—outstanding and never-varying—appeal to your sense of what a car ought to be.

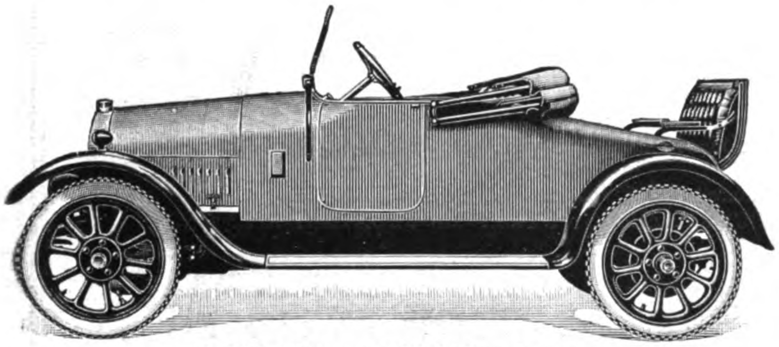
For the HUMBER CAR is built up to sound engineering standards. It has all the speed and every comfort of the most expensive car on the market without its heavy running expenses, and high costs for maintenance.

Riding-comfort over all roads comes from its well-sprung chassis and luxurious bodywork. Economy of upkeep and low cost for repairs result from its unique engine-design. Some cars are naturally extravagant of fuel. The HUMBER yields a full return for every pint of petrol, every drop of oil consumed.



15.9 H.P. 5-Seater Touring Car

"I have owned four other cars" writes one purchaser of a HUMBER 15.9, "but this is incomparably superior to anything I have previously driven."



10 H.P. 2/3-Seater with Dickey Seat open

HUMBER LIMITED

WORKS

COVENTRY, ENGLAND

BETTER SERVICE

Here it is—the greatest improvement, users tell us, in pipe wrenches since we made the well-known "Vulcan."

Williams' "Falcon" Chain Pipe and Fittings Wrench has single jaw, with continuous teeth across its central portion. Gives just the bearing needed on fittings; grips pipe instantly.

Double-ended, reversible jaw assures *service of two wrenches at the cost of one.* Three to four grip positions on every size pipe.

Interchangeable flat link and cable chains—suit yourself. The wrench is extraordinarily efficient with either.

Six sizes for $\frac{1}{8}$ to 12-in. pipe and fittings.

J. H. WILLIAMS & CO.

"The Wrench People"

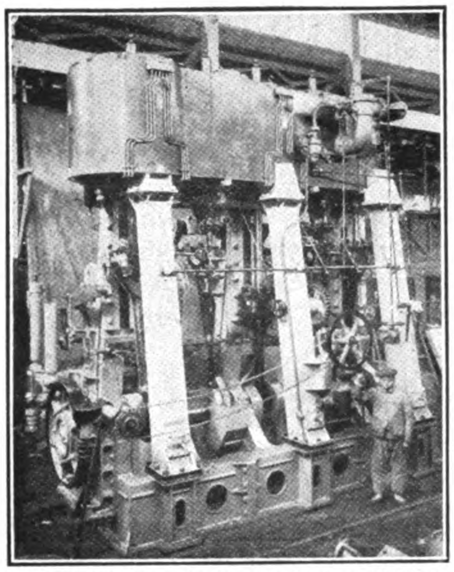
London Representative:
Benjamin Whittaker, Ltd.,
Dept. K.
56 Ludgate Hill, E.C. 4.

Export Office:
124 State Street,
New York, U.S.A.

General Offices:
124 Richards Street,
Brooklyn, N.Y., U.S.A.

THE NEW ENGINEERING & SHIPBUILDING WORKS LTD.

SHANGHAI, CHINA   **Cable Address: "SPEEDY"**



Set of Triple Expansion Engines for Cargo Steamer

ENGINEERS, BOILERMAKERS, ELECTRICIANS, FOUNDERS, WELDERS, SALVAGE EXPERTS

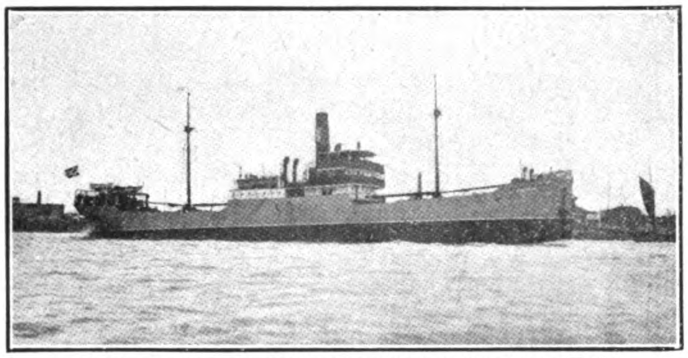
COMPOUND AND TRIPLE EXPANSION ENGINES for marine and stationary purposes.

MARINE MOTOR ENGINES for Petrol, Gasolene, Kerosene or Paraffin.

CONDENSING PLANTS, PUMPS, HOISTING ENGINES, etc.

STEEL STRUCTURAL WORK, BRIDGE GIRDERS AND ROOF TRUSSES

CYLINDRICAL MULTITUBULAR BOILERS, CORNISH and LANCASHIRE BOILERS, VERTICAL BOILERS.



S.S. "Halvdan," one of 8 Steamers Built and Engined at Works

SHIPBUILDERS

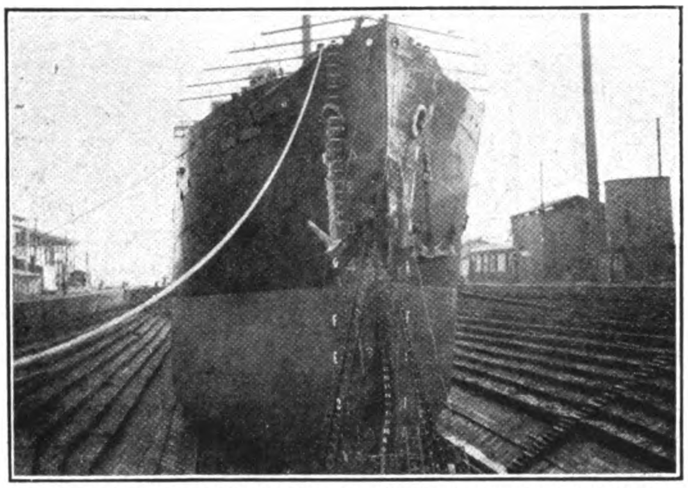
Ocean and River Craft   Oil Carriers

Auxiliary Schooners

Shallow Draft Passenger and Cargo Vessels

Steam or Motor Driven

Steel, Wood or Composite built.



7,000-ton Steamer Docked for Repairs of Damage Sustained in Collision

DOCK PROPRIETORS

Yangtszepoo Dock

Length	577′-0″
Entrance	70′-0″
Width of Sill	60′-0″
Depth on Sill	20′-0″

Patent Slips

for vessels up to 200-ft. long

Vessels docked promptly

General Repairs, Annual Overhauls and Re-classification Work executed efficiently and expeditiously under European Supervision.

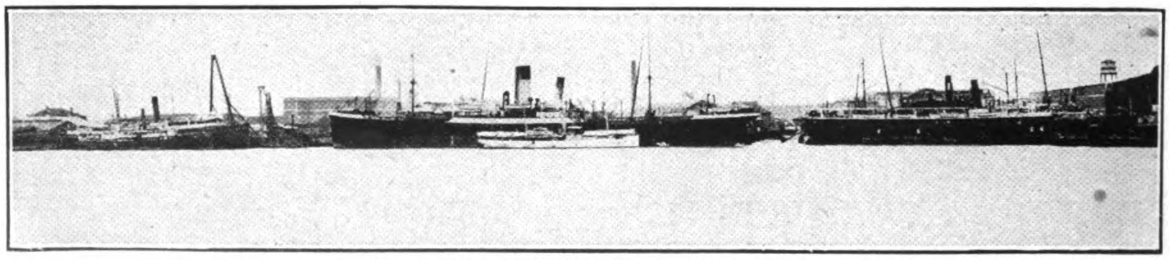
Moderate Charges

Vessels undergoing repairs accommodated at wharves alongside Works.

The Works are equipped with the latest Machine Tools, Electric Drills, Pneumatic and Hydraulic Plant and Tools, Quasi-Arc Electric Welding and Oxy-Acetylene Welding, Galvanizing Plant.

Salvage Experts, Divers and a comprehensive Salvage Plant. Floating Cranes to lift 50 tons and Sheerlegs to lift 80 tons.

THE PROPERTY OF THE COMPANY COVERS AN AREA OF ABOUT 40 ACRES with a RIVER FRONTAGE of 1,800-ft.



General View of Works from River Side

Showing 8 Steamers Berthed Alongside Undergoing Repairs.

Cable Address:
"DOCKYARD" KOBE
"DOCK" DAIREN

A1, A.B.C. (4th and 5th),
Engineering, Scott's, Lieber's
Bentley's
and
Western Union Codes Used

KAWASAKI DOCKYARD CO.,
LIMITED

CONTRACTORS TO THE IMPERIAL JAPANESE ARMY AND NAVY AND TO FOREIGN GOVERNMENTS

KOBE

ESTABLISHED 1870

STEEL MAKERS, SHIP-OWNERS, LOCOMOTIVE BUILDERS, SHIPBUILDERS, ENGINEERS AND REPAIRERS

BRANCHES:

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HYOGO, KOBE
Steel Foundry, Bar Mill and Railway Shops

FUKIAI, KOBE
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ALSO, BUILDERS OF

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LIMITED

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Head Office and Dockyard: URAGA, JAPAN

Branches: TOKYO, YOKOHAMA, YOKOSUKA

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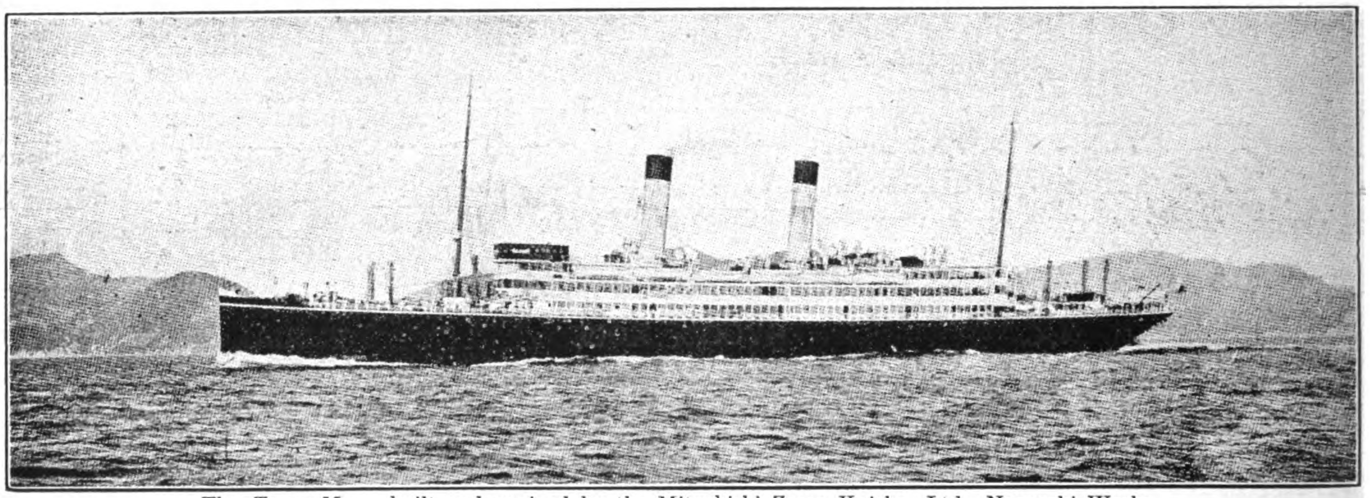
CARGO BOATS
MIYABARA'S PATENT WATER TUBE BOILERS

DREDGES OF ALL KINDS
TSUTSUMI'S PATENT DOUBLE ACTING AIR PUMPS

DRY DOCKS: No. 1, 500-ft. long; 70-ft. wide; 35-ft. deep.
No. 2, 457-ft. „ 66-ft. „ 32-ft. „



The *Tenyo Maru*, built and engined by the Mitsubishi Zosen Kaisha, Ltd., Nagasaki Works

MITSUBISHI ZOSEN KAISHA, LTD., NAGASAKI WORKS

(ex Mitsubishi Dockyard & Engine Works, Nagasaki)

DOCK No. 1

Extreme Length	523	Ft.
Length on Blocks	513	„
Width of Entrance on Top	89	„
„ „ „ „ Bottom	77	„
Water on Blocks at Spring Tide	26½	„

DOCK No. 2

Extreme Length	371	Ft.
Length on Blocks	350	„
Width of Entrance on Top	66	„
„ „ „ „ Bottom	53	„
Water on Blocks at Spring Tide	24	„

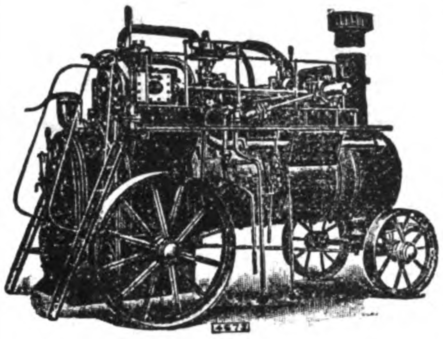
DOCK No. 3

Extreme Length	728.9	Ft.
Length on Blocks	714	„
Width of Entrance on Top	99½	„
„ „ „ „ Bottom	88½	„
Water on Blocks at Spring Tide	34½	„

THE BEST EQUIPPED SHIPBUILDING PLANT IN THE FAR EAST

With Special Facilities for Handling the Heaviest Castings and the Repairing or Building of Ships, Engines, and Boilers
Also Electrical Work

LARGE STOCK OF MATERIAL AND FITTINGS ALWAYS ON HAND



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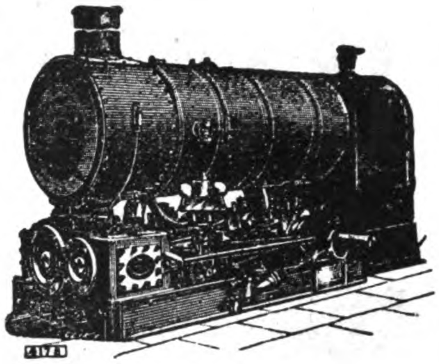
FOR ALL PURPOSES

Ransomes, Sims & Jefferies, Ltd.

IPSWICH, ENGLAND



PORTABLE AND TRACTION STEAM ENGINES, STATIONARY ENGINES, VERTICAL ENGINES, BOILERS OF ALL KINDS, OIL TRACTORS, OIL ENGINES, ELECTRIC ENGINES, MINING MACHINERY.

AGRICULTURAL MACHINERY

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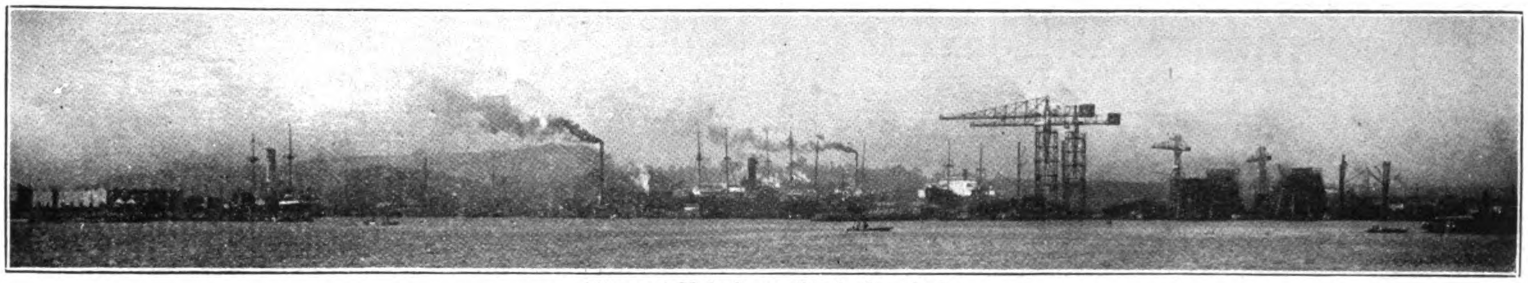
KELLY & WALSH BLDG.,
SHANGHAI

TEL. ADD.: "WHITTALL" PEKING
32 TA JUAN FU HUTUNG,
PEKING



View of Yokohama Dock Co., Ltd.

THE YOKOHAMA DOCK COMPANY, LTD.

Dock Owners, Shipbuilders, Repairers, Engineers, Machinists, Boiler Makers and Warehousemen.
Operating Dockyard, Shipbuildingyard and Storage Warehouses at Yokohama, Japan.

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Builders for
United States Shipping Board,
Japanese Navy,
Nippon Yusen Kaisha,
and other Principal Shipowners

Cable Address:
"DOCK"
Code Used:
A. 1. A.B.C. 4th and 5th, Bentley's

DRY DOCKS:

No. 1	... ...	625′ × 80′ × 28′
No. 2	... ...	380′ × 50′ × 26′
No. 3	... ...	480′ × 63′ × 21½′

SHIPBUILDING BERTHS:

No. 1	... ...	400′ × 27′
No. 2	... ...	490′ × 30′
No. 3	... ...	580′ × 36′
No. 4, No. 5	... ...	680′ × 38′

WAREHOUSES:		TSUBO.
Iron Building	... ...	8,871.57
Concrete Building	... ...	1,636.99
Brick Building	... ...	2,011.72
Others	... ...	5,807.74

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All Repairing Work. All Engine Work. All New Ship Work. All Boiler Work.

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PIG IRON PLATES AND SECTIONS

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CAPITAL: (PAID UP) YEN 30,000,000
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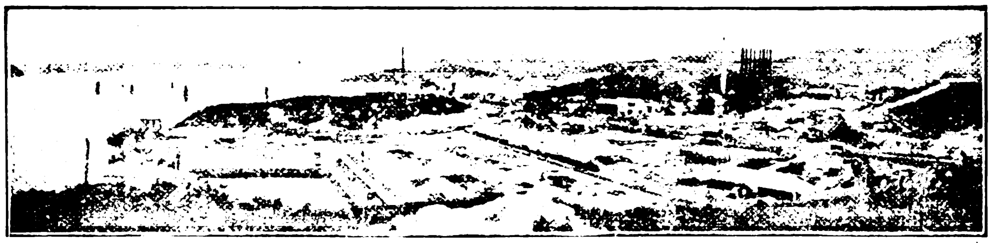

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SHIPBUILDING AND ENGINEERING CO., LTD.

ESTABLISHED 1876

Capital - - - Yen 5,000,000

Shipbuilders, Engineers, Boiler Makers and Machinists.

Manufacturers of
Boilers, Mitchell's Luffing Cranes, Girders, Bridges, Marine Pumps, Turbines, Hydraulic Machinery, etc.

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Branch at WAKAMATSU, CHIKUZEN (Kyushu).

Telegrams: "ZOSEN," TOKYO
Codes: A.1; A.B.C. 5th Edition Impr.;
Bentley's; Complete Phrase; Western Union.

President: Dr. KAICHI WATANABE
Managing Director: TOKURO UCHIDA

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(MITSUBISHI SOKO KAISHA, LTD.)

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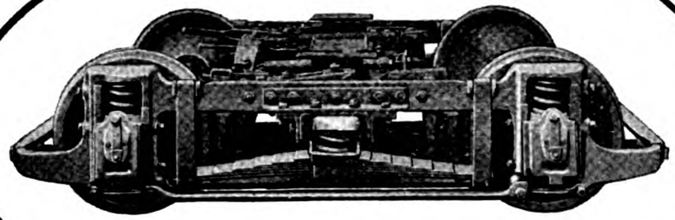
Branches: TOKYO, YOKOHAMA, KOBE, OSAKA AND MOJI

General Managers of the

KYODO UNYU KAISHA

YOKOHAMA

3 KAIGAN-DORI, ITCHOME
YOKOHAMA
WITH TWO BRANCHES IN TOKYO



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24 or 26-in. Wheels

For
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The needs for Heavy Duty Horizontal Boring, Drilling and Milling can be well taken care of by the installing of a Betts Heavy Duty Machine.

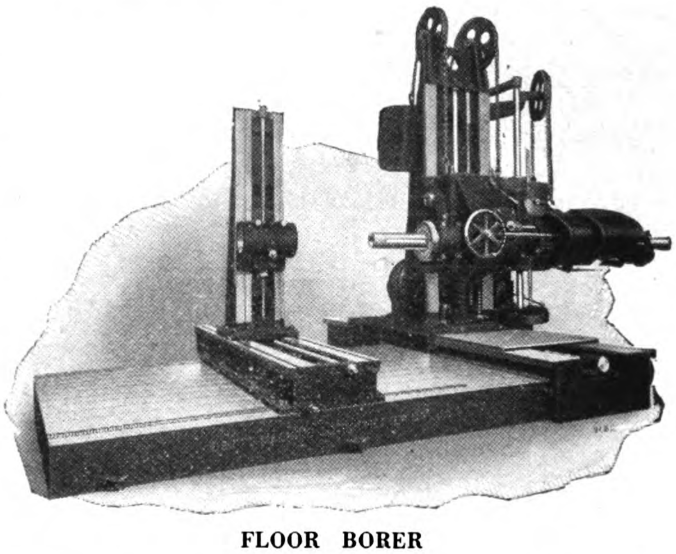
A machine of extremely general use for shipyards and shops having to do heavy machine work. Can be used for all kinds of drilling, milling and boring operations within its capacity.

This machine is made with either $5\frac{1}{2}$ or 6-in. Spindle. The Vertical saddle and horizontal Feed can be made to suit the requirements of the customer. Can be furnished either with or without Floor Plate.

The installation of a Betts Machine raises both the standard of the work turned out and the standard of the workman.

Betts Machines allow for the handling of the work by the machine and the accuracy of the operation to be assisted by the skill of the mechanic.

A Betts Machine Tool for every need in heavy duty work.—Let us have your problems.



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Engine Lathes, Axle Lathes, Journal Trueing Lathes, Vertical Boring and Turning Mills, Tire Turning and Boring Mills, Horizontal Boring Machines, Planing Machines, Slotting Machines, Multiple Spindle Milling Machines and Munition Manufacturing Machines.

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KABUSHIKI KAISHA

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SHIPPING BROKERS

LANDING STEVEDORES

CUSTOM HOUSE WAREHOUSEMEN

WAREHOUSING AREA - - - - - - - - - 77,000 tsubo (308,000 Sq. yds.)
VALUE OF GOODS IN WAREHOUSE (latest date) - - - Yen 275,000,000
CAPITAL (PAID UP) - Yen 5,000,000; RESERVE FUND - Yen 3,098,400

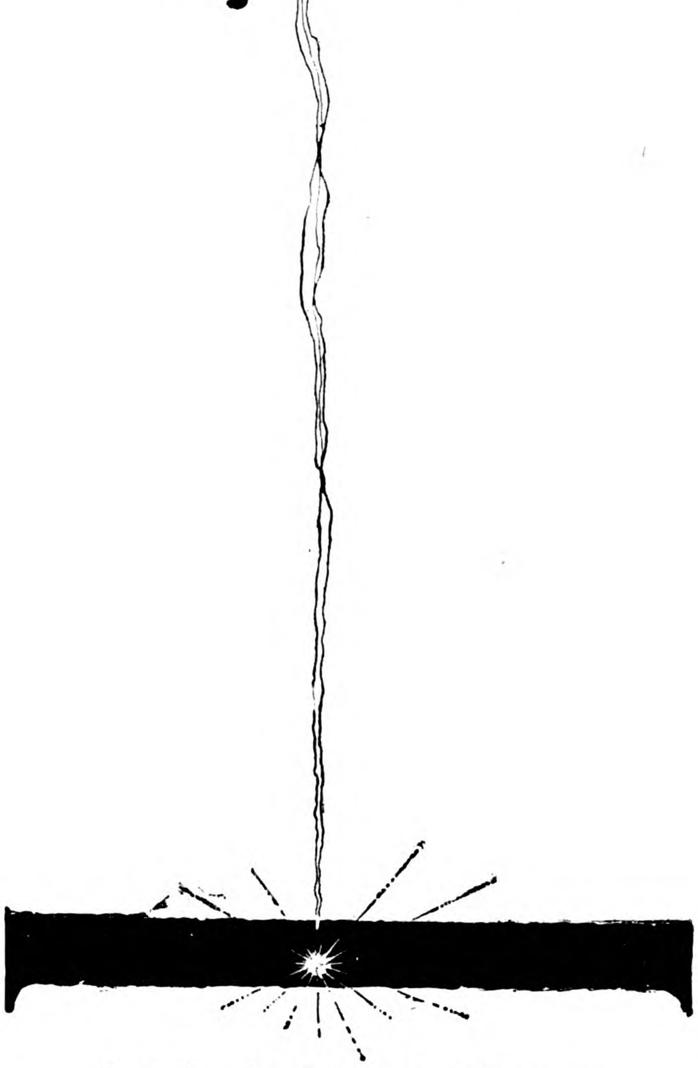
President: TOKUEMON MITSUI
Managing Directors: S. YADA and H. OKUMURA
Directors: K. HAYASHI and K. FUKUI
Auditors: T. MITSUI and T. MAJIMA

HEAD OFFICE: No. 5 HONKAWAYA-CHO, NIHONBASHI-KU, TOKYO

BRANCHES and SUB-BRANCHES:

TOKYO—Hakozaki-cho, Fukagawa-ku
OSAKA—Nakanoshima, Nishi, Utsubo, Aji-kawa, Nishinari, Sakurashima Chikuko
YOKOHAMA—Shinko-cho
KOBE—Kano-cho
MOJI—Hama-cho
SHIMONOSEKI—Kannonzaki-cho

A falling spark



A single unheeded spark, falling upon inflammable material, may grow into a dangerous and destructive fire. But where the

GRINNELL
AUTOMATIC SPRINKLER AND FIRE ALARM

is installed no fire can spread or endure: it is quenched surely and automatically.

Mather & Platt, Ld.

Park Works, MANCHESTER

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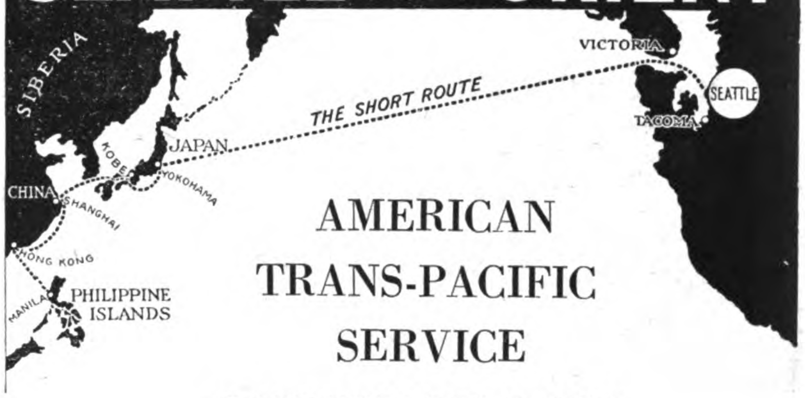

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PASSENGERS-FREIGHT

"THE SHORT ROUTE"

REGULAR sailings to Seattle-Victoria every three weeks by the magnificent new U.S. Shipping Board Steamers SILVER STATE, KEYSTONE STATE, BAY STATE and WENATCHEE. Length 535-ft., Beam 72-ft., Speed 17½ knots.

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ANYWHERE ON THE PACIFIC
PACIFIC STEAMSHIP COMPANY

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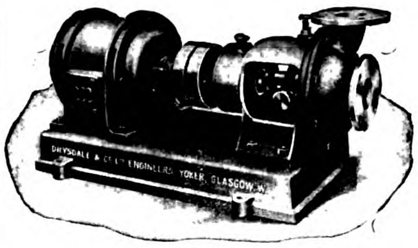

"O" Type Single Suction Electrically Driven Pump

Self-Lubricating Centrifugal PUMPING ENGINES.

MARINE and LAND TYPES for all DUTIES.

HIGH SPEED ENGINES for driving DYNAMOS, FANS, ETC.

Try "Bon Accord" Packing for the Stuffing Boxes of your Pumps and Engines.

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and all other animal products

Require offers, samples and consignments. Bank reference. De Hollandsche Bank voor de Middell. Zee. (The Dutch Bank for the Mediterenean—Amsterdam.)

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THE BLUE FUNNEL LINE

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FAST SERVICES:—

Japan, China, Hongkong, Philippines, Straits and Java to Europe via Suez Canal and to New York via Suez and Panama Canals also

Trans-Pacific between Oriental ports and West Coast of N. America.

Agents: **BUTTERFIELD & SWIRE**

CHINA NAVIGATION CO., LTD.

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SHANGHAI TO, AND FROM,

Weihaiwei, Chefoo and Tientsin (for Peking); Newchwang; Antung.
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Canton; Hoihow, Pakhoi and Haiphong; Bangkok and Singapore.
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OF HONGKONG, LTD.

SHIPBUILDERS, SHIP REPAIRERS, ENGINE BUILDERS, BOILERMAKERS, ETC.

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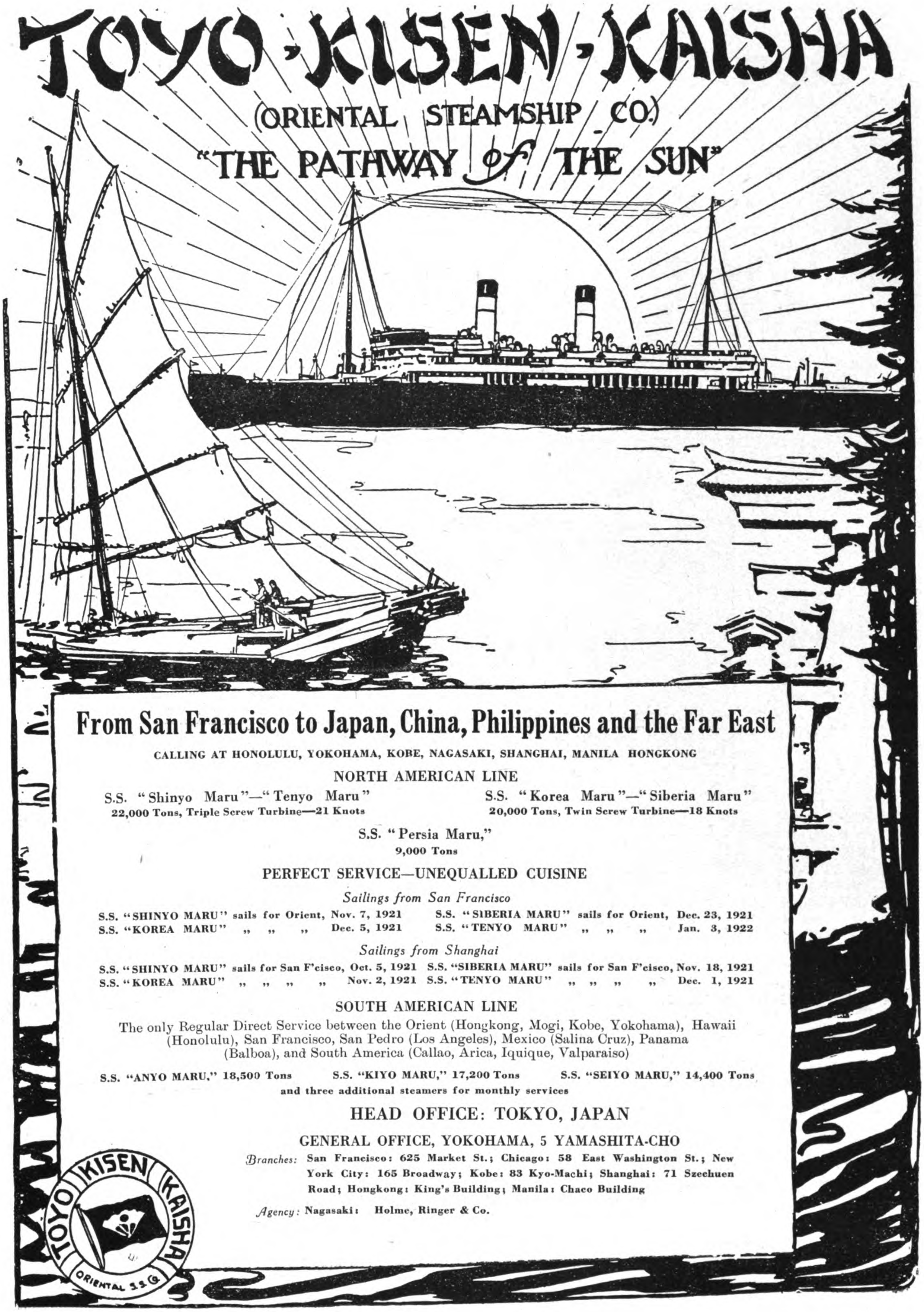
TOYO-KISEN-KAISHA
(ORIENTAL STEAMSHIP CO.)
"THE PATHWAY of THE SUN"
From San Francisco to Japan, China, Philippines and the Far East
CALLING AT HONOLULU, YOKOHAMA, KOBE, NAGASAKI, SHANGHAI, MANILA HONGKONG
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S.S. "Shinyo Maru"—"Tenyo Maru"
22,000 Tons, Triple Screw Turbine—21 Knots
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20,000 Tons, Twin Screw Turbine—18 Knots
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9,000 Tons
PERFECT SERVICE—UNEQUALLED CUISINE
Sailings from San Francisco
S.S. "SHINYO MARU" sails for Orient, Nov. 7, 1921
S.S. "KOREA MARU" „ „ „ Dec. 5, 1921
S.S. "SIBERIA MARU" sails for Orient, Dec. 23, 1921
S.S. "TENYO MARU" „ „ „ Jan. 3, 1922
Sailings from Shanghai
S.S. "SHINYO MARU" sails for San F'cisco, Oct. 5, 1921
S.S. "KOREA MARU" „ „ „ „ Nov. 2, 1921
S.S. "SIBERIA MARU" sails for San F'cisco, Nov. 18, 1921
S.S. "TENYO MARU" „ „ „ „ Dec. 1, 1921
SOUTH AMERICAN LINE
The only Regular Direct Service between the Orient (Hongkong, Mogi, Kobe, Yokohama), Hawaii (Honolulu), San Francisco, San Pedro (Los Angeles), Mexico (Salina Cruz), Panama (Balboa), and South America (Callao, Arica, Iquique, Valparaiso)
S.S. "ANYO MARU," 18,500 Tons
S.S. "KIYO MARU," 17,200 Tons
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Branches: San Francisco: 625 Market St.; Chicago: 58 East Washington St.; New York City: 165 Broadway; Kobe: 83 Kyo-Machi; Shanghai: 71 Szechuen Road; Hongkong: King's Building; Manila: Chaco Building
Agency: Nagasaki: Holme, Ringer & Co.
TOYO KISEN KAISHA
ORIENTAL S.S. Co.

Osaka Shosen Kaisha

(Osaka Mercantile Steamship Co.)

HEAD OFFICE: OSAKA, JAPAN

Cable Address: "SHOSEN, OSAKA."

Branches and Agencies at all the important ports in the World.

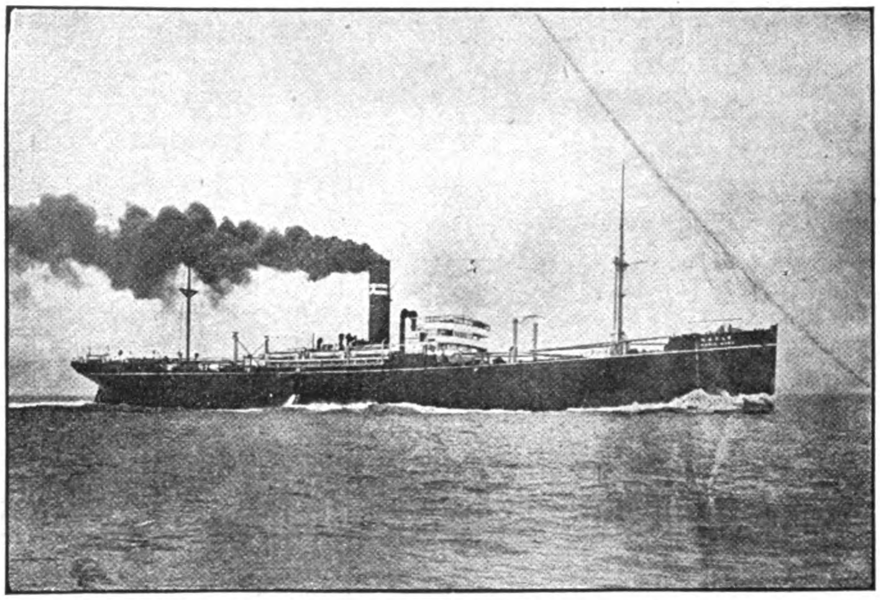
Codes Used: A1, A.B.C. 5th Ed.,

Scott's 10th Ed. & Bentley's.

Capital: Y. 100,000,000

Reserves: Y. 66,000,000

40 Regular Lines with a Fleet of 500,000 Tons Gross.



PRINCIPAL REGULAR LINES:

JAPAN-EUROPE LINE (via Suez)—Monthly—Ports of Call: Yokohama, Kobe, Moji, Shanghai, Hongkong, Singapore, Colombo, Port Said, Marseilles, London, Antwerp, Rotterdam and Hamburg.

JAVA-EUROPE LINE:—Monthly—Ports of Call: Sourabaya, Padan, Colombo, Port Sudan, Suez, Genoa, Marseilles, Antwerp and Hamburg.

CALCUTTA-NEW ORLEANS LINE: 7 sailings per annum—Ports of Call: Calcutta, Singapore, Hongkong, Nagasaki, Kobe, Yokohama, San Francisco, Balboa, Cristbal, Cienfuegos and New Orleans.

SINGAPORE-NEW YORK LINE:—Monthly—Ports of Call: Singapore, Hongkong, Shanghai, Moji, Kobe, Yokohama, San Francisco, Balboa, Cristbal, Havana and New York.

JAPAN-BOMBAY LINE:—Fortnightly—Ports of Call: Yokohama, Yokkaichi, Osaka, Kobe, Moji, Hongkong, Singapore, Colombo and Bombay.

HONGKONG-PUGET SOUND LINE:—Fortnightly—Ports of Call: Hongkong, Manila, Keelung, Shanghai, Nagasaki, Kobe, Yokkaichi, Shimizu, Yokohama, Victoria, Seattle, Tacoma and Vancouver.

JAPAN-SOUTH AMERICA LINE:—Monthly—Ports of Call: Yokohama, Kobe, Nagasaki, Hongkong, Singapore, Colombo, Mauritius, Durban, Cape Town, Rio de Janeiro, Santos and Buenos Ayres.

JAPAN-AUSTRALIA LINE:—Monthly—Ports of Call: Yokohama, Kobe, Osaka, Moji, Hongkong, Manila, Sydney, Melbourne and Adelaide.

JAPAN-JAVA LINE:—Monthly—Ports of Call: Osaka, Kobe, Moji, Keelung, Manila, Sandakan, Tawao, Batavia, Sourabaya and Macassar.

SERVICES TO CHINA.—

OSAKA—Dairen Line.—Semi-Weekly.
OSAKA—Tientsin Line.—6 Sailings per month.
OSAKA—Tsingtau Line.—2 Sailings per month.
YOKOHAMA—Dairen-Tientsin Line.—About 8 Sailings per month.
TAKAO—Tientsin Line.—2 Sailings per month.
Keelung-Hongkong Line.—Weekly.

Besides the above mentioned, Mail and Passenger Services are maintained by over THIRTY-FIVE REGULAR LINES, calling at all important ports in JAPAN, as well as STRAITS, DUTCH EAST-INDIES, FORMOSA, CHINA, KOREA, Etc., Etc.

COMPANY'S LOCAL OFFICES IN CHINA

AMOY, CANTON, FOOCHOW, HANKOW, SHANGHAI, TIENTSIN, DAIREN, HONGKONG

KOKUSAI KISEN KAISHA

Nominal Capital	- -	Yen 100,000,000.00
Paid-up Capital	- -	,, 87,500,000.00
Aggregate Tonnage	- -	500,000 Tons

FLEET OF STEAMSHIPS

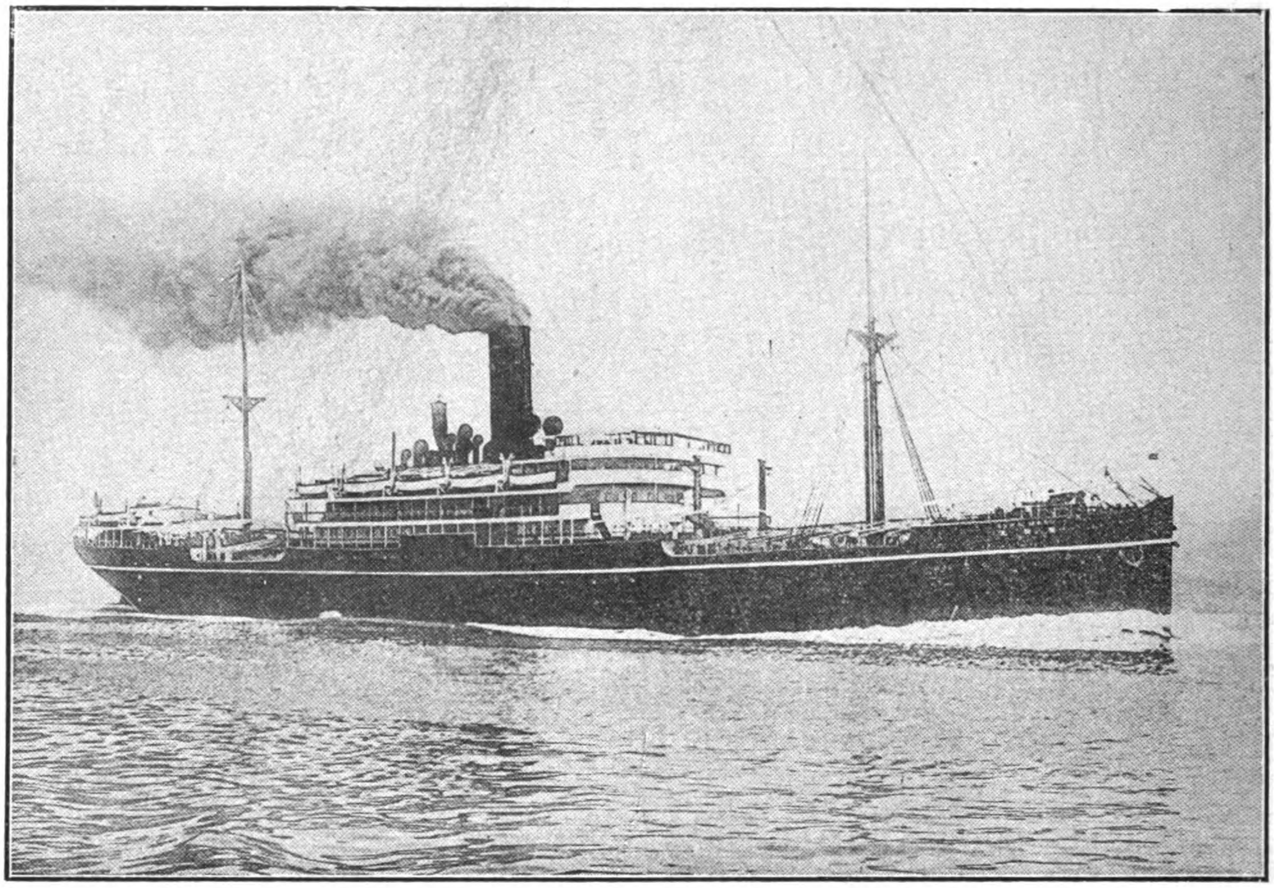
Name	Tons D.W.	Name	Tons D.W.
Rozan-Maru	8,700	Seifuku-Maru	9,100
Vancouver-Maru	9,100	Suez-Maru	6,600
Boston-Maru	8,800	Daio-Maru	9,000
Tofuku-Maru	9,100	Kashu-Maru	8,800
Chifuku-Maru	9,100	No. 2 Kifunesan-Maru	5,000
Ryufuku-Maru	9,100	Yousan-Maru	5,000
Hankow-Maru	6,400	Taisan-Maru	5,000
Yoni-Maru	11,000	Yuri-Maru	11,000
Taibu-Maru	8,900	Texas-Maru	11,000
San Francisco-Maru	9,100	Tamatsu-Maru	6,600
Naple-Maru	9,100	Eifuku-Maru	9,100
Glasgow-Maru	9,100	Kifukü-Maru	9,100
Yayoi-Maru	8,700	Toyofuku-Maru	9,000
Yaye-Maru	11,000	Raifuku-Maru	9,100
Malta-Maru	8,700	Keifuku-Maru	9,100
Buyo-Maru	8,800	Washington-Maru	9,100
Brazil-Maru	9,100	Tokufuku-Maru	9,100
Kofuku-Maru	9,100	Portland-Maru	9,100
Yezari-Maru	6,900	England-Maru	9,100
Yugao-Maru	5,000	Chili-Maru	9,100
Yubaye-Maru	5,000	Argentine-Maru	9,100
Sydney-Maru	6,400	Port Said-Maru	9,100
Shanghai-Maru	6,400	New York-Maru	9,100
Singapore-Maru	9,100	Karorin-Maru	6,400
Jyufuku-Maru	9,100	Tasmania-Maru	6,400
Hiyeizan-Maru	6,700		

Head Office: No. 8 Kaigan-dori, Kobe

BRANCH OFFICE:

Tokyo Kaijo Building, Maruno-uchi, Tokyo, Japan

NIPPON YUSEN KAISHA



PRINCIPAL LINES:

EUROPEAN LINE—Fortnightly

LIVERPOOL LINE—Every 4 weeks

HAMBURG LINE—Every 4 weeks

SEATTLE LINE—Twice a month

NEW YORK LINE (via Panama)—Every 4 weeks

SOUTH AMERICAN LINE—Once every 2 months

AUSTRALIAN LINE—Monthly

CALCUTTA LINE—Fortnightly

CALCUTTA-NEW YORK LINE—Monthly

BOMBAY LINE—Fortnightly

JAPAN-JAVA-CALCUTTA LINE—Monthly

SHANGHAI LINE—3 times a week

NORTH CHINA LINE—9 times a month

SOUTH SEA ISLANDS LINE—Semi-monthly

In addition to the above, numerous lines are also operated to principal Ports throughout the world.

NIPPON YUSEN KAISHA

(JAPAN MAIL STEAMSHIP CO.)

Fleet 100 Vessels **Gross Tonnage 500,000**

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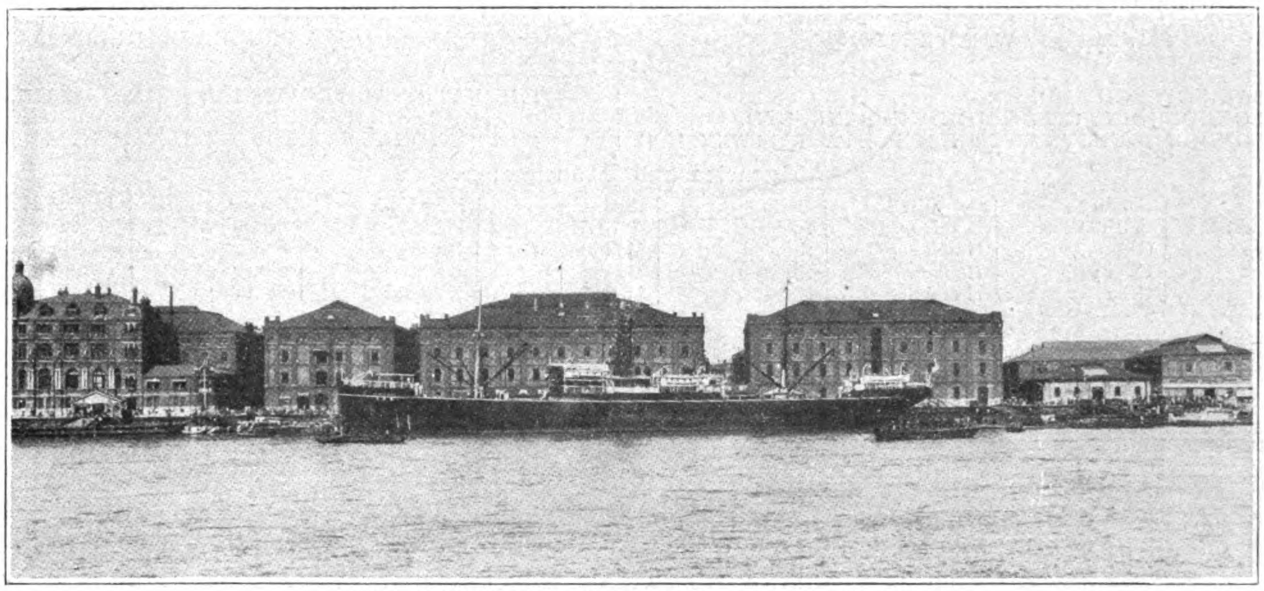

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The Far Eastern Review

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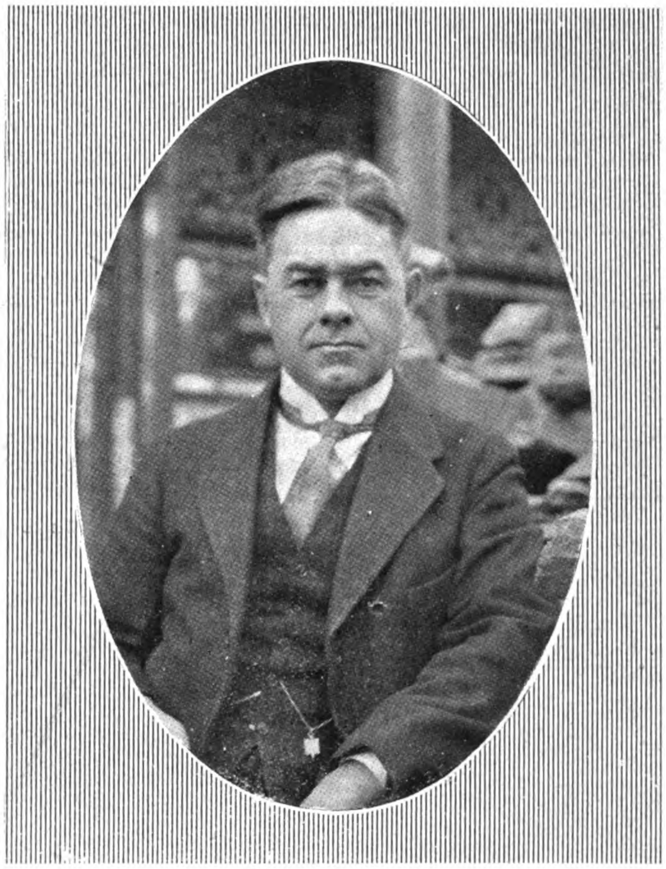
Red Cross Roads in North China

WITH a record of 856 miles of new roads built and 3,572 wells dug, the work of the American Red Cross in North China came to an end on August 10th. Faced with the problem of transporting food over vast stretches of roadless territory to villages and communities whose inhabitants were facing death by starvation, the directors of the Red Cross Society decided that the best way to alleviate the suffering and at the same time provide work for the unfortunates was to concentrate upon opening up new roads through these districts. In the face of great difficulties the work has been carried through to a point where the people have been provided for until the next harvest. There are many phases of this great work which deserve special notice and which is treated fully in the official Red Cross publications. Manufacturers of road machinery, however, will be interested in learning that the above work was carried through with shovel, pick, wheelbarrow and stone rollers all of local manufacture. No modern machinery was employed, no iron culverts used. In fact, steam road rollers can be employed successfully only on certain long level stretches in north China. As a market for foreign materials, road making in China reduces itself to one for automobiles and possibly carts, or board tired American wheels. The use of automobiles and autobuses is the one direct benefit to foreign manufacturers arising from these new roads, and already one enterprising Chinese company is operating an autobus service out from Tamingfu with four large machines carrying about 15 passengers each trip. The charge is $6.00 (Mexican) for a twenty-mile trip, or three times the charge for cart traffic.

The bussess are always filled, indicating that the Chinese merchant recognizes the value of time saved and is willing to pay for it. It is expected that similar autobus lines will be established at the more populous centres along these roads. Perhaps the most commercially important of the roads completed by the American Red Cross is the one in Shansi province which leaves the provincial highway at Pingyaohsien and passing through the large city of Fenchow, terminates at Jung-Tu, on the Yellow River, thus providing a water outlet to this immensely wealthy district. The Chinese authorities intend to develop the little village into an up-to-date river port. Another road which opens up great commercial possibilities is the one in the eastern part of Shansi running south from Pingtingchow into the iron, coal and pottery districts. Mr. Baker, the director of the Red Cross operations in China, is enthusiastic over the work in this province, and says that the Pintingchow road has brought prosperity to the whole community, the potters and blacksmiths were given a new lease of life. Vitrified clay pipes were made for drains by the potters at an exceptionally low cost, while the iron workers turned out shovels, picks, hammers and other tools required in road construction.



Mr. J. E. Baker

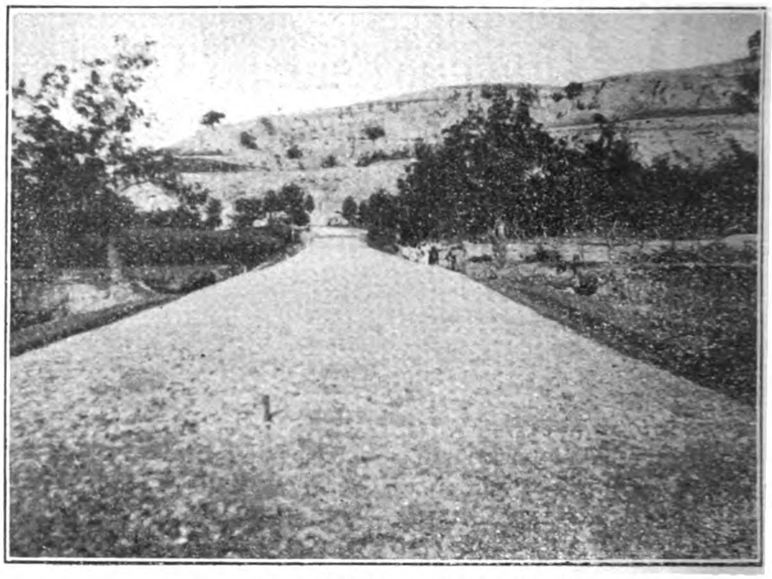
Adviser to the Chinese Ministry of Communications and Director of the American Red Cross, China Famine Relief. Under his direction over 800 miles of roads have been built in North China

The greatest difficulty confronting the maintenance of these new roads lies in the use of the narrow, one and a half inch tires, which quickly destroy even the best of metalled surfaces. In addition, the real swagger Chinese cart wheel is serrated like a narrow cog wheel and when it gets busy on a new road the result is heartbreaking to the maintenance engineer. The Red Cross has sold about a hundred sets of broad tired wheels in addition has sent into Shansi a large amount of iron to be made into tires. The Chinese authorities in the first flush of the benefits arising from these new highways are showing a deep interest in their maintenance and a desire to extend the system as fast as they can. Tolls are collected for this purpose, and although present indications tend to prove that these revenues are being expended for road improvement, it is almost hopeless to look for prolonged civic righteousness under existing conditions.

The road work has provided many opportunities for careful studies into basic construction costs that will prove of great value in other development work in China. Mr. Baker's tabulation of labor and other costs would seem to indicate that past methods of earthwork construction on Chinese railways are unduly and excessively high, due largely to the practice of using Chinese contractors who pay the workers the current wage and amass huge profits. As an instance of basic costs, he invites attention to the costs of the Shantung

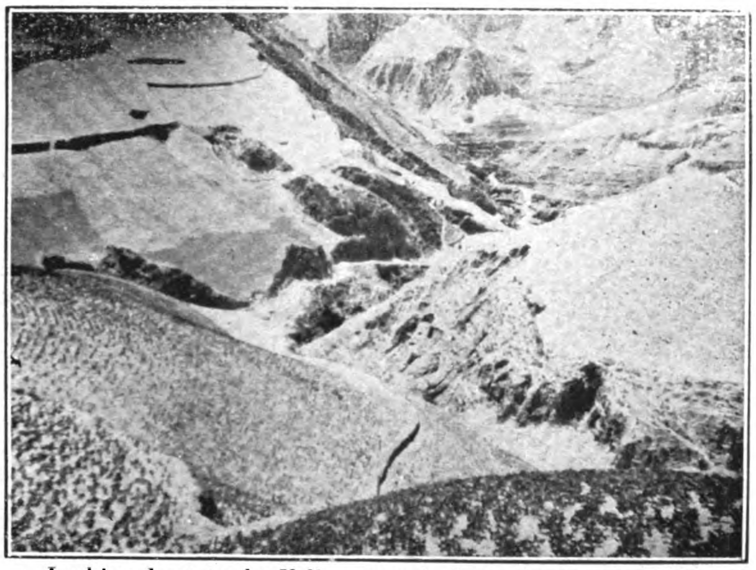
SECTIONS OF THE COMPLETED ROAD

Entering Mut-Sun

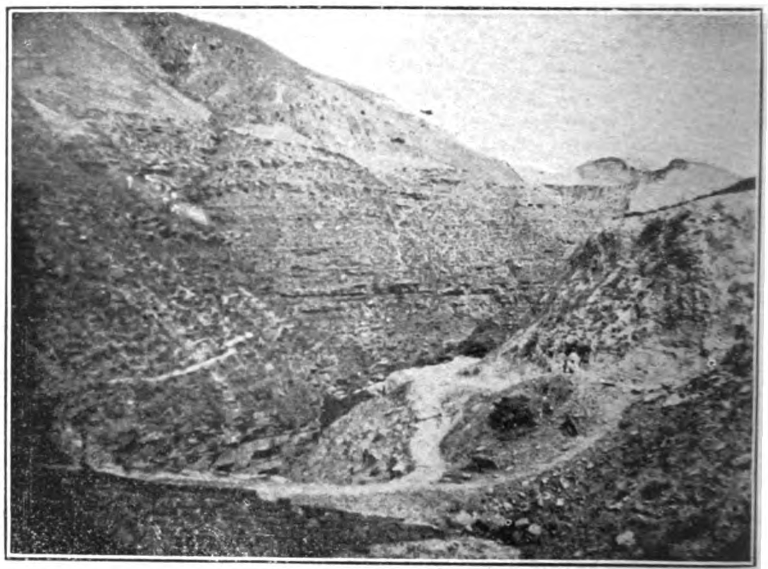


Approaching the Village of Yu Chu Tsun

THROUGH THE LOESS HILLS

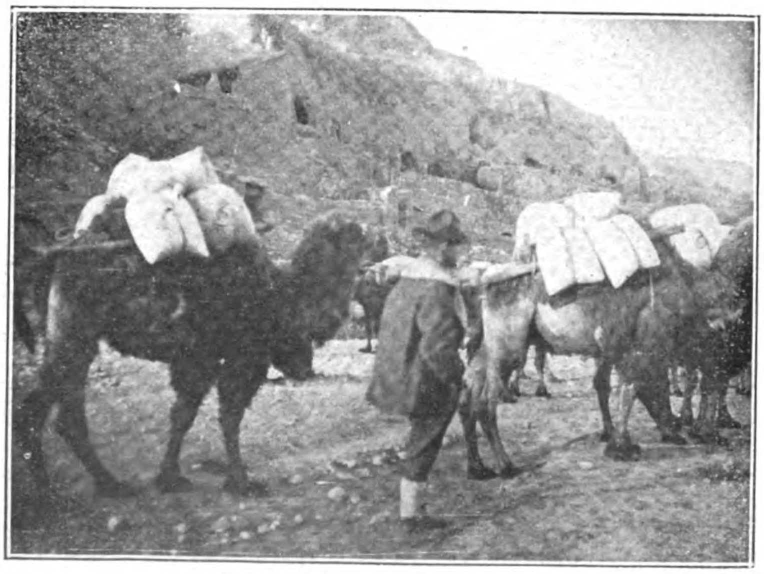


Looking down to the Valley towards Jung Tu from top of the Pass (Le Ja Wan)

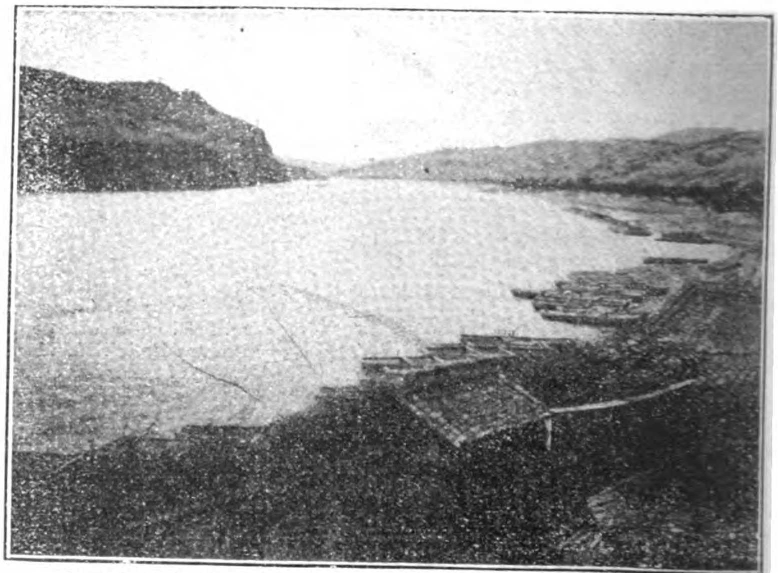


Looking down towards Jung Tu from the old Trail

TRANSPORTATION MEDIUMS



Camel Trains near Wah Chang



Looking North up the Yellow River at Jung Tu, the finish of the Red Cross Road

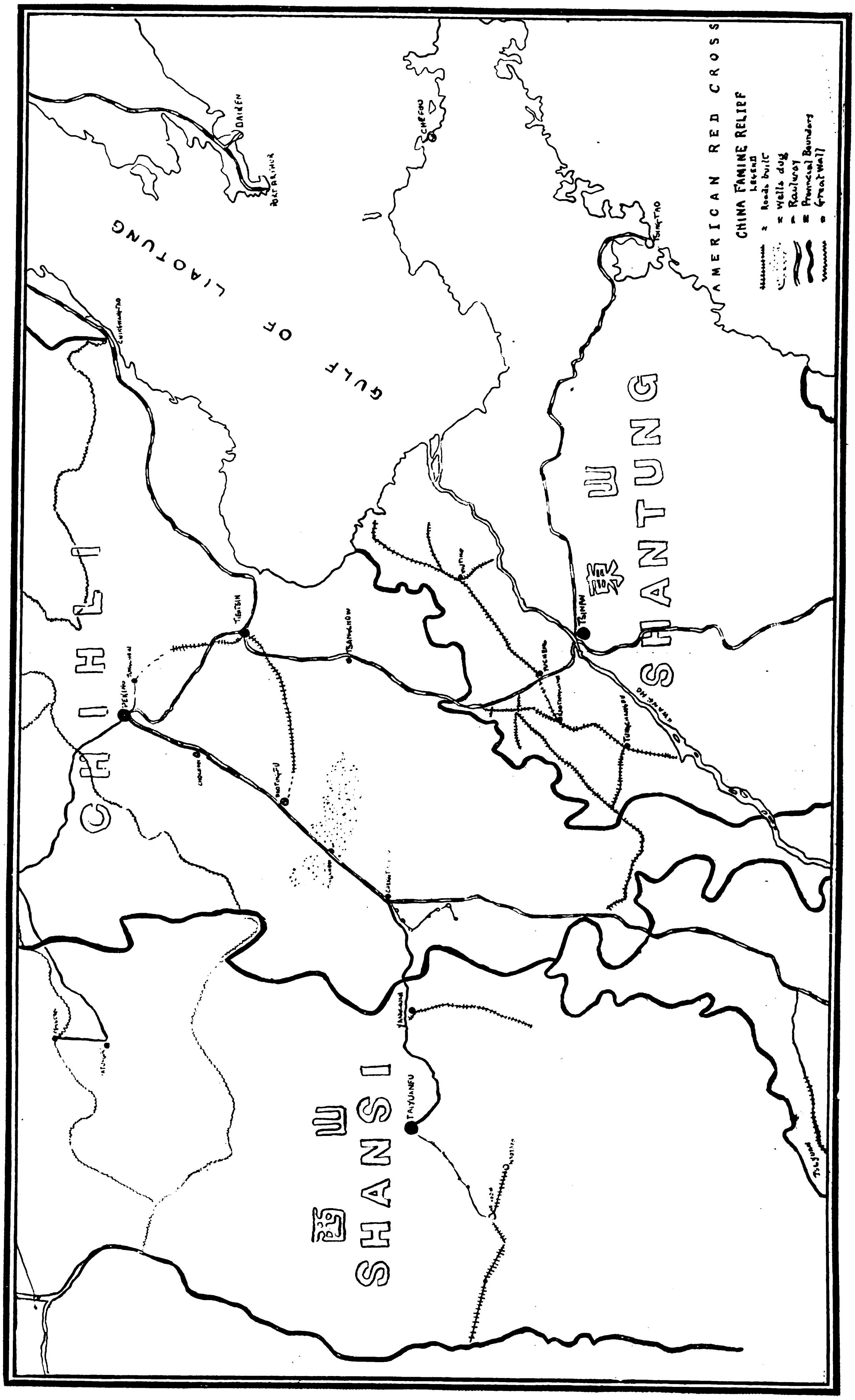
roads, $1,719 per mile, which includes supervision, engineering, medical attention, etc., as against a cost of $1,333 per mile for the earthwork of the Tao-ching railway constructed fifteen years ago when labor and food costs were half what they were last winter. That part of Mr. Baker's report dealing with costs is still uncompleted, but in due time, it will be made public.

In concluding his last repoıt, Mr. Baker gives a very interesting summary of the work done up to August 10th. The following extracts will give a comprehensive idea of the great work which he has so successfully brought to a happy conclusion:—

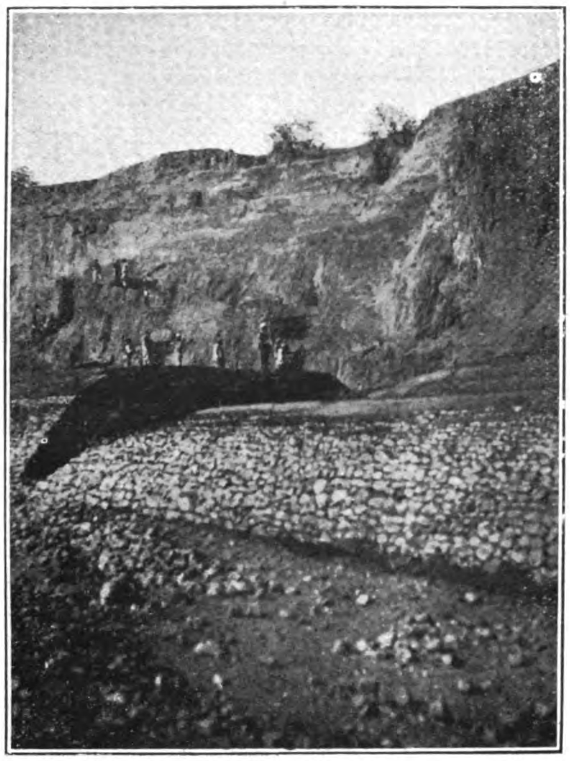
"The American Red Cross support of the Tientsin-Peking highway operation closed on July 31st, the appropriation having been exhausted. However, an organization known as the Peking-Tientsin highway commission has secured a gift of $50,000 (Mex.) from the American advisory committee and the work will proceed under the direction of the same personnel and the same form of organization as that employed by the American Red Cross.

"The Honan operations were discontinued on July 31st with the work completely done except for four miles, for which macadam could not be secured due to the impassibility of connecting roads. This work will be completed during the autumn by other funds in the hands of the individuals composing the American Red Cross organization at that point.

"The Shansi operations are not complete and the balances remaining under the appropriations have been placed in the hands of the local organization. The Yellow River Road is con-



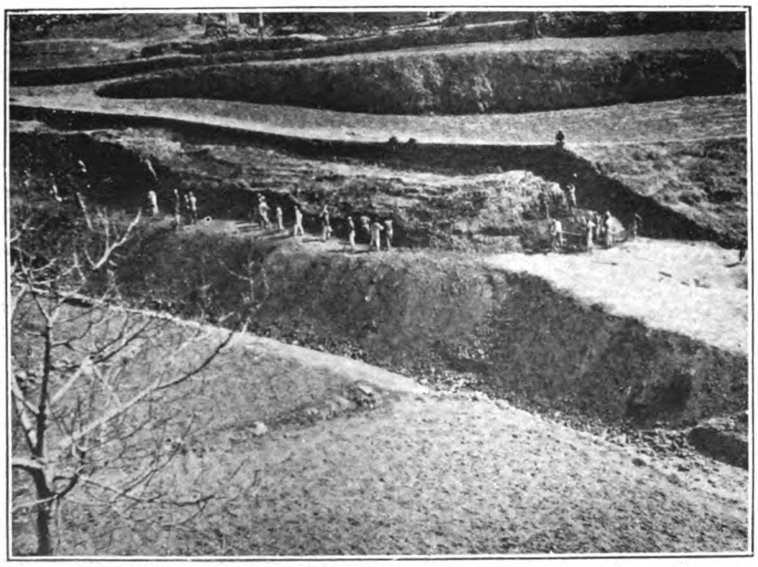
sidered 75 per cent. complete. There remain some seven miles of rock blasting and a considerable number of bridges and culverts yet to be finished. This project has received a grant of $150,000 (Mex.) from the Shansi Famine Relief Society, which in turn received much of its resources from the American advisory committee. This amount, supplemented by our revenue funds, should be



Road Building

sufficient to complete this job. The Pingtingchow operation can be finished economically with the funds in hand.

"Practically all of our roads have suffered considerably from the very heavy rains of the past three weeks. These rains have been heavy enough to break the seasoned railways in many places.



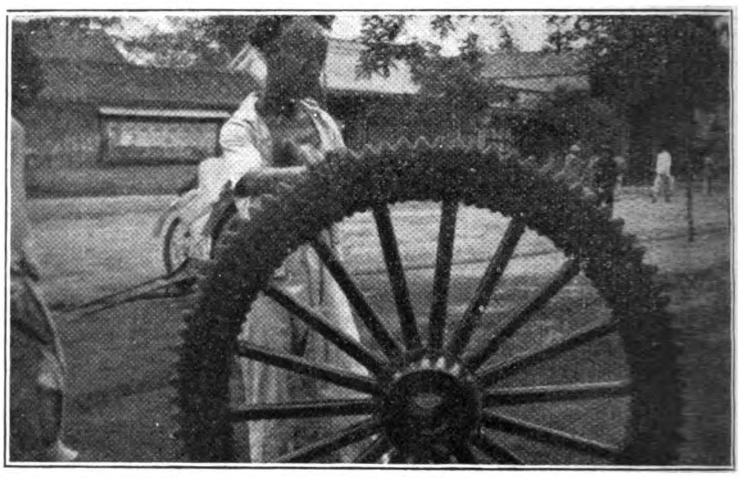
Above War Chur

Devastating floods are reported in almost every province. The losses which we have sustained are about as follows :

Yellow River Road	$65 ,000 (Mex.)
Pingtingchow Road...	10,000 (Mex.)
Hantan Road	8,000 (Mex.)
Shantung Road	2,000 (Mex.)
Total	$85,000 (Mex.)

"Not all of this is unfortunate as in the two Shansi projects it gave the engineers the exact data which they needed to work upon in making the slight re-location and revision of culvert sites. On the Pingtingchow road, it is now clearly shown that about two miles were located below the high flood level.

"Summarizing the work which has been accomplished under the direction of the American Red Cross, China Famine Relief, reference is made to the July report showing approximately 145,000 workmen recruited and 841,000 persons reached by relief. These figures are not to be altered by the period which has elapsed since.



A Chinese Road Devil

The saw tooth wheel of a swagger Peking Cart, the "bete noir" of the modern road maker

"In this work of relief there has been expended (in round numbers) local currency $2,428,000, This total is distributed as follows :

	Amount	Per Cent.
Food and wages to workmen...	$2,025,000	83
Medical and sanitary	25,500	4
Commissary, salaries, quarters, etc	92,500	1
Engineering, autos, horses, etc.	181,000	8
General (Peking and field headquarters) ...	104,000	4
	$2,428,000	100

"With respect to the amount of construction produced by this organization, the following summary is given :—

Shantung	485 miles	(50,000 trees planted also)
Shansi :		
Pingtingchow ...	78 ,,	(will be completed with American Red Cross funds)
Yellow River Road and branches ...	123 ,,	(75% complete)
Chihli :		
Hantan-Taimingfu	46 ,,	
Paotingfu-Tientsin	75 ,,	
Peking-Tientsin ...	12 ,,	(in unconnected sections)
Honan	37 ,,	(All macadamized except for four miles)
Total	856 miles	
Tingchow Well project	3,572 wells completed	

"Approximately 15,000 tons of grain have been purchased and distributed on these projects.

"In gaging this amount of work it must be remembered that up until February 19th we were not aware that we should have at our disposal more than $500,000 (Gold), plus a few miscellaneous pledges. Only the Shantung operation had been organized at that time. Two of the heaviest projects are through difficult mountain territory and two others are in regions subject to flood where careful attention had to be given to drainage. Conception, organization, survey, provisioning and executing of the work has

been thrust into this limited compass of time. The quality of some of the work and the expense of considerable of it have been sacrificed, of course, in order to make employment available in time for it to be of service.

In view of this condition, it may be worth while to consider the final approximate costs :

Operation	Miles	Expenditure (Local Currency) Total Dollars	Per Mile Dollars
Shantung	485	834,000.00	1,719.00
Hantan	46	115,000.00	2,500.00
Pingtingchow	78	500,000.00	6,410.00
Ping Yao	21	25,000.00	1,200.00
Honan	37	70,000.00	1,880.00
(Thirty-three miles macadamized)			
Tientsin-Peking	12	50,000.00	4,166.00
Paotingfu-Tientsin	75	5,400.00	600.00
(Repair work only)			
Tingchow Wells	3,572 wells		$27.19 Per well (Red Cross portion only)

"In the past considerable has been said concerning the inefficiency of famine labor. Certain comparisons which are now possible are valuable on this point. Take the Shantung operation for example,—the cost figure is $1,719 (Mex.) per mile. These costs include supervision, engineering and medical service as well as actual payment to laborers. The most economically constructed railroad in China, the Taokow-Chinghua shown a cost of $1,333 per mile of line for the earthwork alone. This was constructed some fifteen years ago when the costs of labor and food for labor were less than one-half of the costs during the past winter. In addition it must be remembered that the American Red Cross deliberately carried on work during the winter months when frost made efficiency impossible, in order to keep up the relief phases of the work.

"If one may judge from current expressions of opinion, future attempts at relief of distress in China will take the form of employment upon works of public improvement much more generally than in the past. Hence a comprehensive report covering the methods followed, forms used, prices paid, etc., in our various operations is being prepared with the hope that it may be of service when future relief is required."

Tin Mining in Malaya

Shrinkage of Exports from Federated Malay States

LAST year's export of tin from the Federated Malay States amounted to 34,935 tons, valued at £10,316,737, compared with 36,935 tons in 1919, valued at £8,736,474. In 1918 the exports amounted to 37,370 tons. In his annual report Mr. A. R. Mynott, A.R.S.M., acting senior warden of mines, F.M.S., states that at the opening of the year the price of tin on the local market was $167.50 per picul, with the market rising. The rise continued rapidly until at the end of February the unprecedented high price of $212 was reached. Thereafter a reaction set in until, at the beginning of December, it stood at $90 per picul. The position at that time became so critical that to save a large number of the mines from closing down, and the consequent dislocation of labor that would ensue, the government decided to purchase. From December 14 the government were purchasing at $110 per picul, which price was raised on December 21 to $115, and that was the position at the close of the year. The fluctuation was $122 in the year under review as compared with $66 in 1919. The extraordinary rapid rise in the price at the beginning of the year was due chiefly to the operations of speculators, and the reckless buying was, no doubt, due to the erroneous deductions that a falling off in production was anticipated with consequent reduction of supplies, that the central European powers would be in a position to assimilate amounts approximating their pre-war requirements, and that consumption in the United Kingdom and America would increase. The slump at the end of the year was due to a variety of causes, chief amongst which was the reduced consumption demand, the unexpected unloading of stocks of Dutch tin on the London market, liquidation of large stocks of Chinese tin which had been held up in Chinese ports owing to the high price of silver at the beginning of 1920, the disorganization of the Welsh tinplate industry towards the end of the year, the instability of exchange, and the general labor unrest. The outlook at the end of the year was not encouraging, general conditions were bad, and no improvement in the market could be anticipated.

The table below shows actual export of production in each state for the last three years :—

	1918.	1919.	1920.
Perak ... (Piculs)	387,750	371,722	371,848
Selangor	170,359	178,608	148,715
Negri Sembilan	16,246	14,761	11,710
Pahang	53,460	55,427	54,632
Total	627,815	620,518	586,905

Labor

The labor force employed on mining at the end of the year (inclusive of individual licences, but exclusive of holders of dulang passes) was 89,557, all of whom, with the exception of 610 on gold and 3,000 on coal, were employed on tin and tungsten mining. The numbers in 1919 were 113,107 and in 1918 144,621. The labor force is the lowest recorded for twenty-one years. There were 12,867 dulang pass holders in 1920 compared with 15,553 in 1919 and 15,774 in 1918. Duland pass holders in the three western states earned on an average $251 per head, an increase of $54 per head over 1919.

There were 26,096 employed under contract, 37,908 on wages, 24,941 on tribute and 612 held individual licences. The nationality of those employed was as follows: Europeans, 274; Chinese, 82,811; Indians, 4,489; Malays, 1,907; and others, 79. There was a decrease in Chinese of 22 per cent. as compared with 1919.

Machinery

The total effective horse-power of the various mechanical plants employed on mines is estimated at 64,360 (including the gold mines at Raub and the colliery at Rawang). Plant was not so difficult to get, but was still enhanced in price. The use of gravel pumps is on the increase, and very few open-casts in Perak are now worked by old-fashioned methods. There were twenty bucket dredges operating, eighteen of them in Perak. Bucket dredges proposed and under construction amounted to thirty-two at the end of the year. It is interesting to note the change that is occuring in the fuel supply following on the mining of Malayan coal. The consumption of coal was 88,839 tons in 1919 and 102,270 tons in 1920.

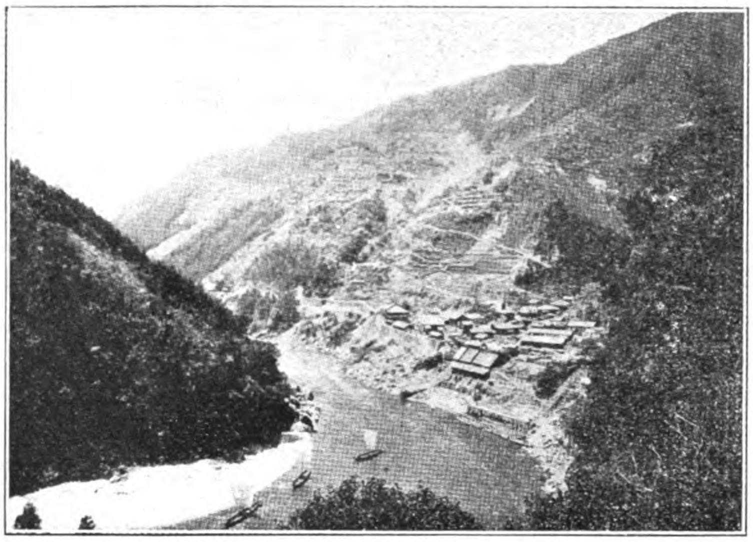
General

In his closing remarks, Mr. Mynott states that mining costs were very high at the beginning of the year, but the slump at the end of the year made it necessary for miners to consider seriously reducing the cost of production, with the result that wages were considerably reduced to, in some cases, as much as 20 to 25 per cent., and it is to be remarked to the credit of those concerned that the situation was accepted without trouble. Approximately, 64 per cent. of the mines were under Chinese management compared with 68 in 1919. In 1913 this percentage was 74. Thirty-seven sterling companies, with issued capital totaling to $3,643,692, and thirty-three dollar companies, with an aggregate issued capital of $13,081,250, are operating in the Federated Malay States; and, in addition, there are four French companies, whose total capital amounts to 10,890,000 fcs.

Ore Resources of Japan

WHEN Sir Harry Parkes, British minister to Japan, landed in Kagoshima in 1866 he was surprised to find a foundry in active operation, where the Japanese "without European aid, cast great cannons, shot and shell, and work a steam turning-lathe." An officer from H.M.S. *Princess Royal*, who accompanied Sir Harry ashore, describing his impressions to a friend, said: "There is certainly among these people the germ of a future greatness in the manufacturing world, and many of their works, even now, would be worthy of notice in any international exhibition." There is no need now to emphasize the fact that the forecast of that British naval officer was exceedingly accurate; Japan has taken a prominent position in the manufacturing world. Incidentally it may be mentioned that a British squadron had been actually engaged with the forts at Kagoshima three years prior to Sir Harry Parkes's visit, and doubtless some of the "great cannons, shot and shell" with which the Japanese attempted to drive off that punitive expedition were made in the very foundry which the British minister subsequently visited.

It is not the purpose of this article to give a dry statistical account of the mineral resources of Japan and of the industries associated with mining and metal working. Those who are interested in the exact amount of ore brought to the surface and the precise value of manufactured metal exported are referred at once to the very excellent reports issued periodically by British consular officials in Japan, and to the various publications bearing upon industrial development and commerce issued by the Japanese government from time to time. It is rather the intention of the writer to outline the history of mining and metallurgical industry in Japan, and to give a general idea of the mineral resources of the country and the aptitude of the people in utilizing them.



Kune Mines, Furukawa Gomei Kaisha

A Wrong Impression

There was a general impression in Europe, 60 years ago, that Japan was almost an "El Dorado" land. Marco Polo appears to have been largely responsible for this idea, and many Dutch writers elaborated upon it. Portuguese and Spaniards told the same tale, and it is an interesting fact that the first Englishman to reside in Japan, Will Adams, was closely questioned by the highest personages in the land with the object of obtaining some clue as to the precise position of certain "islands of gold and silver" of which European navigators used to speak as being somewhere off the coast of Japan. Poor Will, however, was no wiser than the mariners from the Mediterranean who were endeavoring to find a north-west passage to the Indies. But when Japan was re-opened to foreign intercourse, and the "hairy barbarians" from the West saw with their own eyes that gold coins were in use, their fondest hopes seemed to be confirmed. The country was very quickly drained of its gold coinage—and Sir Rutherford Alcock, the British representative in Japan, made some very severe comment on the unscrupulous methods of some of his countrymen in this connection—and to the surprise of those who seemed to think that almost any rice-field was a potential gold mine, there was no bullion in reserve wherewith to make new gold coins!

From the point of view of variety, it is probably correct to say that there is no country in the world which has more mineral resources than Japan. From sulphur to silver, from coal to gold, from tin to tungsten—almost every mineral known can be found in some parts of the country, though it must be confessed that in many cases the quantity and quality of the return are not such as to make exploitation an attractive commercial proposition in these days of keen competition. Yet the fact remains that Japan has a wonderful range of mineral deposits, and for centuries mining has been an established industry. Deposits of silver were found in 674 in the island of Tsushima, and a few years later gold is said to have been obtained there; but the supply of both metals was small, and there are suspicions that the yellow metal actually came from Chosen merely by way of Tsushima. Until the eighth century Japan relied mainly on Chosen for the precious metals, although some of them came from China.

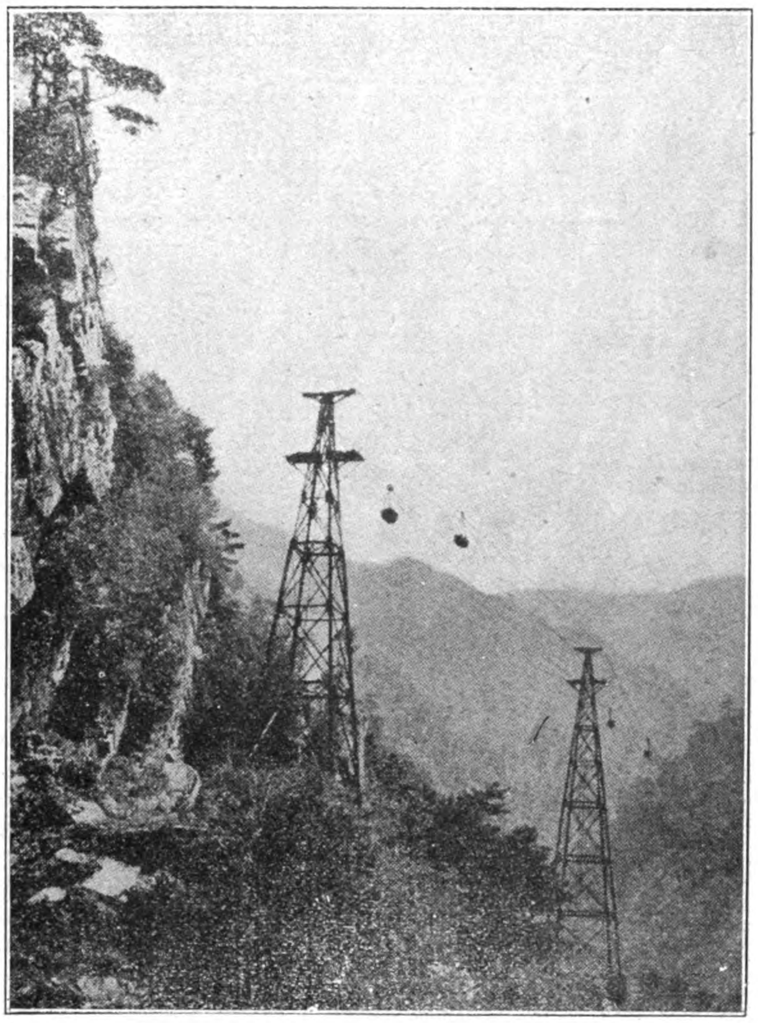
Mint Established

In the year 708 copper was found in the province of Mushashi, and the event was considered of sufficient importance to warrant commemoration in perpetuity by calling the year "Wado" (refined copper), following the custom of designating periods by employing the name of some momentous happening as an appropriate title for the era. A mint was established, gold, bronze and silver coins were struck, and for 250 years coinage continued to be issued at various mints until the supply of available copper was exhausted. For more than 600 years minting operations were suspended, and from the fact that rarely more than 20 tons of copper were used for this purpose per annum it might be inferred that mining operations in those days were small indeed. They were, but not so small that the demands of the mints could not be met. Copper was wanted to make temple bells and images, and those who have seen the great bronze bells and idols in Japan will quickly realize how the demands of the Buddhist priests must have cleared all available stocks off the copper market. And not only so, but hundreds of thousands of "cash" were thrown by the pious into the melting-pots from which the bells and idols were made, so that the decision to suspend minting operations was due as much to religious fervor as to undeveloped mineral resources.

That considerable progress was made in developing the mineral resources of Japan during the long years that minting was suspended is proved by the fact that early in the 15th century large quantities of copper were exported to China. An interesting relic in the shape of a shipping invoice (1458) shows that among the ship's cargo were 410,000-lb. of sulphur and 206,000-lb. of copper. Gold, too, was much more valuable in China than Japan, and since the metal fetched from four to six times its home market price when sold in Ningpo, it is fair to suppose that a large proportion of the gold mined in Japan found its way across the sea to Chinese buyers. Hence, perhaps, the fanciful stories about Japan being wondrously rich in precious metals. It is known that there was a marked

development of mining in Japan about this time, and when the great Hideyoshi began to resume the minting of gold and silver coins, the gold mines at Sado and the silver mines at Ikuno had increased their output enormously as the result of adopting improved (though still very crude) methods of working.

This was in 1587, and during the century following Dutch traders carried away 50 "tons" of silver every year, and later on concentrated their energies upon the copper market, of which



Sumitomo Company. Aerial Tramway at the Besshi Copper Mine

metal they are said to have carried away 1,000 "tons" a year. Mention has been made above of the adoption of "improved" methods of working mineral deposits ; reference must be now made to an interesting incident which occurred somewhere about 1609, which shows that even in those days the Japanese were eager to learn from foreigners how their own methods could be improved upon. The Shogun Ieyasu engaged some shipwrecked Dutch sailors to give what instruction they could in casting cannon and in artillery practice. Next he seized the opportunity of another shipwreck to suggest to the governor-general of the Philippines (an involuntary visitor to Japan) that 50 Spanish mining experts should be sent to Japan to introduce new methods of working.

Ieyasu's Policy

The Japanese in those days had no great liking for the Spanish or the Portuguese since all visitors from Manila and Macao were suspected to be bent upon religious propaganda, but so anxious was Ieyasu to get expert advice and assistance that he was prepared to take the risk of politico-religious complications following the introduction of Spanish subjects to the country. The governor-general of the Philippines agreed to the suggestion, but on hard terms. First, in regard to the output of the mines, one-half was to be given to the Spanish experts, and the balance equally divided between the King of Spain and Ieyasu. More than this, he stipulated that the King of Spain should send officials to protect his majety's interests in the mines, and, more presumptuous still, in the circumstances then existing in Japan, Spanish priests were to accompany these officials and erect churches wherein their compatriots could receive spiritual consolation. Yet so anxious was Ieyasu to get expert assistance from foreigners whereby to develop the country's mineral resources, that he agreed to the amazing terms submitted ; but the plan never materialized, owing to the death of the Shogun.

What changes might have been brought about had this enterprising project been brought into operation it is difficult to say. The Dutch at Deshima for two centuries exerted an enormous influence for good in a quiet way, for, unlike the visitors from Manila and Macao, the Hollanders meddled not at all in politico-religious affairs. With 50 (and eventually, perhaps, many more) Spaniards introducing foreign methods, words and ideas to Japanese who knew nothing of the outside world, and had not even been impressed by a sight of the great ships from overseas which periodically visited their shores, it is not impossible that Ieyasu's experiment would have had far-reaching results. With improved methods of mining might have come improved methods in many other directions, possibly leading to quite a different course of events in the Far East from those now recorded in history.

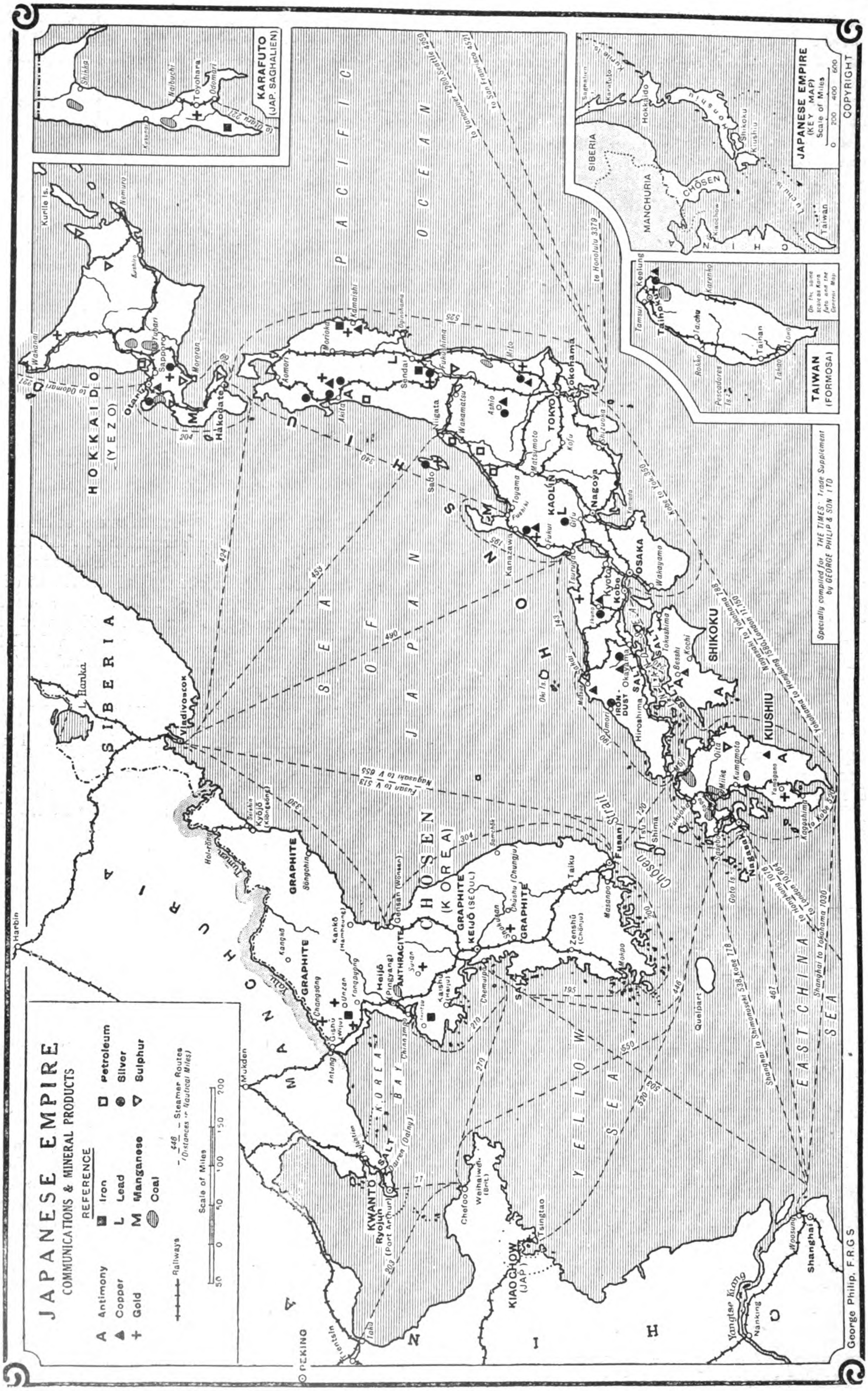
In spite of the fact that the outfit of a miner consisted of nothing more than a wedge and a hammer, quantities of gold, silver and copper were exported from Japan through the Dutch traders. Finally, only the baser metal left the country, to the extent of a thousand "tons" a year—but not tons of 20cwt. The so-called tons of gold and silver were merely units representing value in gulden, and a "ton" of gold represented a quantity valued in those days at 100,000 gulden. But the export was substantial, all the same, and early in the 18th century bitter complaint was made that Japan was being drained of all the gold, silver and copper mined during Ieyasu's time and since, and bartered for foreign fripperies of sundry descriptions that could be done without.

A Drastic Reply

That this protest had some effect appears evident from the fact that towards the end of the 18th century the Dutch were complaining bitterly about the difficulty of getting sufficient supplies of copper for export. The answer they got was exceedingly brusque ; they were told that if they again pressed for larger supplies not only would they be refused, but the goods the Dutch had imported to exchange for copper would be burned, and all further trade forbidden. As the Hollanders continued to trade at Deshima until 1858 it may be assumed that they were content with such share of the "precious marrow of the Japanese mountains" as was permitted to come their way.

Yet, while the scheme for introducing foreign mining experts fell through, the Japanese were already employing Portuguese and Dutchmen to instruct them in the arts of metal-working. There was a foundry in Yedo (Tokyo) under Dutch management in the middle of the 17th century, in addition to that at Hirado, and as far back as the middle of the 15th century there is record of a Portuguese being engaged for three years in the capacity of cannon-founder. Some fine specimens of bronze ordinance, relics of a battle in 1580, are still in existence. At Hirado (where the Dutch first carried on trade, before being transferred to Nagasaki, or Deshima) cannon were made with material and labor at less than half the cost "in Christendom," and the output totaled some 40 pieces a year, both of brass and of iron.

Much could be written concerning the wonderful work done in Japan between the 10th and 14th centuries by the makers of swords and armour, in further proof of the skill and ingenuity of the Japanese in metal-working. With the crudest of tools and methods, there was nothing—from casting huge bronze bells and Buddhas to the tempering of a tiny dagger or a great two-handed, double-



JAPANESE EMPIRE—COMMUNICATIONS AND MINERAL PRODUCTS

edged sword—that the Japanese workers in metal could not accomplish, and their achievements in those far-off times are objects of astonishment and admiration even today.

Such in outline is the history of mining and metal-working in Japan during the long period when the country was neither commercially nor industrially of any importance—though not lacking in interest.

Fifty Years of Enterprise

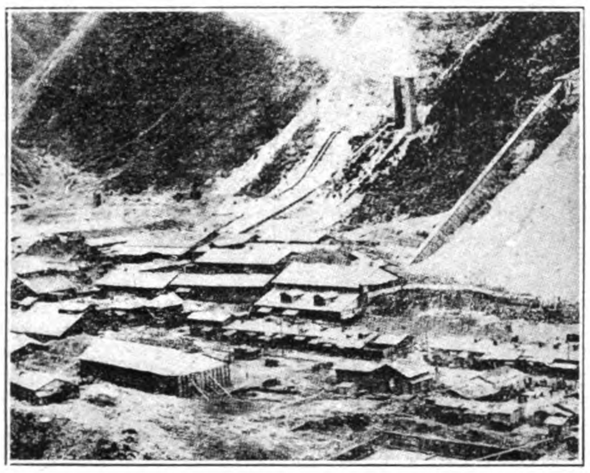
The last 50 years were a half-century of intense effort in energy and enterprise which has brought Japan to a position of no small importance as an industrial and commercial power. In 1868 an Englishman named Glover was engaged by one of the feudal lords to sink a shaft in Kiushiu at a place called Saga, about half-way between Nagasaki and Moji, and not far from the now well-known coaling-port of Karatsu. In 1870 the Japanese government decided to engage foreign expert assistance in developing the gold mines on the island of Sado, off the west coast of Japan—whither persons guilty of criminal and political offences of a certain degree had been exiled. For more than 200 years gold had been obtained on the island by the most primitive methods. The quartz was crushed with iron mallets, and although there were some 4,000 miners, crushers and laborers employed they could not handle more than about seven tons of ore a day.

The government was led to believe that the introduction of modern machinery would increase the output considerably, and that the amount of gold thus recoverable would be very substantial. Accordingly a foreign engineer was engaged, and the necessary plant was obtained from Europe, but it was found that the field was not so rich as it was expected to be, and for many years working was continued at considerable loss. In 1872 the Japanese government established a school for instruction in mining and metallurgy, and in the same year explosives were used for the first time, under the guidance of one of the foreign experts engaged by the government. From these small beginnings came the great mining industry of modern Japan, the importance of which can be gaged from the following figures of a year's output :—

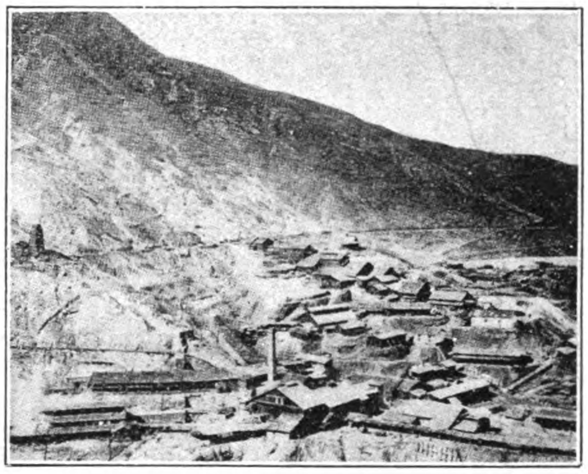
Copper	96,000 metric tons
Silver	6,500,000 oz. fine
Lead	11,000 tons
Antimony	400 tons*
Gold	245,000 oz.
Zinc	39,000 tons
Manganese ore	55,000 tons
Phosphorous ore	192,000 metric tons
Coal	28,000,000 metric tons
Sulphur	64,000 metric tons
Sulphur ore	21,000 metric tons

figures need not be considered at the moment. Of the proved coalfields the estimated deposits amount to 3,760,000,000 tons, of which 1,738,000,000 tons are regarded as being practically available. Of this coal "in sight," 1,000,000,000 tons are in Kiushiu, 568,000,000 in Hokkaido, and 170,000,000 in the various other small fields scattered through the main island. In 1919 the output of coal was the largest on record. During the war the industry was most active, owing to the enormously increased home consumption, consequent upon the great boom in manufacturing industries and to demands from various points overseas.

It is obvious that there is no cause for anxiety in Japan about coal resources, but it is otherwise as regards the cost of coal. Wages and all other charges have increased enormously, and mine-owners are much worried about the restriction of female labor which was agreed upon at the international labor conference held at Washington. In Kiushiu alone there are 50 000 women working in and about the coal mines (of whom probably 30 000 go down the pits), and it is declared that night-work will be impossible if the law prohibits the employment of women. The introduction of an eight-hour day all round could be managed without difficulty, but the abolition of female labor between 10 p.m. and 5 a.m. would be disastrous—so the mine-owners say. On the other hand, there is little doubt that the conditions under which most of these women work are prejudicial to the ultimate prosperity of the nation, and


Arakawa Mine

TWO MITSU BISHI COMPANY MINES


Osaruzawa Mine

the industry will adjust itself to the new conditions (when imposed) without any such catastrophe as is apprehended by those now employing women in the mines.

The total annual value of Japan's mineral products stands at about 45,000,000 sterling, of which coal and copper represent the most valuable individual items. Both are subject to violent fluctuations in price, due both to domestic and outside conditions, but between them coal and copper may be taken as representing about one-half of the country's mineral wealth.

Most of the coal raised in Japan is mined in Kiushiu, the southern island; the principal ports—Nagasaki and Moji—are known the world over as coaling stations for ships of war and of commerce. About 75 per cent. of Japan's coal output comes from Kiushiu, and 10 per cent. from Hokkaido, at the other extreme of the island empire. The balance is supplied by scattered mines on the main island, from Shimonoseki to the north of Tokyo. In Karafuto (the Japanese half of Saghalien) there are some very rich seams of similar quality to those worked in Hokkaido and running in places to a thickness of 50-ft. An official estimate places the amount of coal available in workable seams not more than 2,000-ft. below drainage level at 820,000,000 tons, with workable seams at a lower depth which will give another 2,940,000,000 tons. Possible, but unproved, deposits are set down at over 5,000,000,000 tons, according to the same official estimates, but these

Copper Resources

Japan stands second on the list of the world's copper-producing countries, though she comes a very long way behind the United States. More than half the world's output is American copper, but of the other half-dozen leading producers Japan stands first. The Ashio and the Besshi mines are among the most important sources of supply, the former being regarded as the largest copper mine in the Far East. A remarkable hydro-electric plant at Ashio, generating over 10,000 horse-power, is an interesting feature of a gigantic undertaking, while no less interesting is the "one big family" system of working the Besshi mine. This property has been in the possession of the Sumitomo family since 1691, and the men and women employed there are the descendants of generations who have worked there before them. It may be added that the eight-hour day was introduced in this mine many years ago by the proprietor, and no women are employed underground. In a country—and an industry—where consideration by employers for the welfare of their workers is not yet universal, the "happy family" of some 10,000 men, women and children at Besshi is at least worthy of passing mention. Other important copper mines are those at Kosaka (in one of the northern-most provinces), at Hitachi (north of Tokyo), and Sagonoseki (in Kiushiu).

*Enormous quantities of antimony were shipped to the United States during the war, and the 1915-17 output amounted to some 24,000 tons. Trade has now dropped back to pre war conditions. In 1917 the production of copper totaled 111,000 tons, but owing to the violent fluctuations of the metal market the output from all Japanese mines varies considerably according to circumstances.

These five mines contribute considerably more than half the total output of the country, the score or more of other mines being quite small concerns.

American Competition Keen

For about 12 months prior to the outbreak of the war, the export of copper from Japan was at a very low ebb, owing to heavy slumps in prices. As about two-thirds of the output was ordinarily exported, the industry generally was in a most depressed condition, but prices went up with a rush on the outbreak of hostilities in Europe. Large orders were received from Europe and America, and production was rapidly speeded up to meet the urgent requirements of the times. In 1917 the copper exports of Japan amounted in value to nearly nine millions sterling; the following year they dropped to four millions, and in 1919 to less than two millions. Last year there was a further decrease, the total export amounting only to 12½ million yen (say £1,250,000). In 1919 large quantities of copper were imported into Japan, owing to the high prices then prevailing in the country, but this business was purely speculative, and must not be regarded as indicating that domestic production has fallen below the demand. Producers have great hopes of increasing their business with China, but American competition in that market is very keen, in spite of the long haulage.

Most of the silver produced in Japan comes from the great copper mines. The gold and silver mines on Sado Island (mentioned above) are the most important of their kind, but the output of silver from this source is only about one-sixth of the quantity recovered by electrolytic treatment of the copper ore mined at Ashio. It is probably correct to say there is no silver mine in Japan of any size which is a paying proposition; on the other hand, the amount of gold and silver found with copper is very considerable, and so an increased output of copper invariably means an increased production of gold and silver in the country. In 1917 the output of silver in Japan was over seven million ounces, but this figure does not bulk very large against the 75 millions from Mexico and the 55 millions from the United States. The mines from which silver is obtained are widely scattered, and are distributed throughout the country from the extreme north to the extreme south. Of the former those at Innai (opened in 1599) are worth mention, and were once the most productive in the country; of those further south the mines at Ikuno, near Kobe, are of importance. Two mines ar worked for gold and silver, and a third for silver and copper. Ikuno has the reputation of being one of the best-managed mining concerns in Japan.

Lead and Zinc

The domestic output of lead is insufficient to meet requirements, amounting to less than 10,000 tons. Imports of ore and metal are necessary, and during the war some very large orders were placed in Australia, China and elsewhere in order to meet the demands for munition-making and other purposes. New smelting works were erected, and in 1919 lead ingots and slabs to the value of over a million sterling were imported in addition to large quantities of ore. Last year, however, there was a substantial decrease in both lines, and import figures are gradually resuming more normal proportions. The extension of lead works and refineries suggests that more ore and fewer slabs will be imported in order to meet the domestic requirements of industry.

Prior to the war some 30,000 tons of zinc ore were exported annually from Japan to Europe, and about one-third of that quantity was imported from Britain, Belgium and Germany in the shape of slabs, sheet and dust. There were some refineries in Japan, but very small and insignificant concerns; when the demand for the metal increased, and over-seas supplies were cut off, the existing plants were rapidly extended, and many new refineries established. Instead of exporting ore for treatment, Japan began to import the raw material and export the finished article; in 1917 zinc ingots and slabs were exported to the value of considerably over two millions sterling. Since then there has been a considerable slump in the industry, as most of this business was in connection with munition-making in Europe. In 1919 the export of zinc dropped down to about £300,000, and last year there was a further slump to the microscopic figure of £12,000. With an annual demand for 20,000 tons, and a domestic supply of only 6,000 tons, there has been a big market in Japan for foreign zinc, most of which has been imported from the United States.

Sulphur and Petroleum

An item which must not be overlooked, however, is sulphur, which is very plentiful in the country and was very largely exported during the war. Production more than doubled between 1913 and 1918, and exports more than trebled, owing to the great overseas demand in connection with the war. In 1919 there was a very heavy slump in the export trade, and the figure indicates a rapid return to pre-war level. The domestic demand is large, and the mines contain ample supplies. Generally speaking, only the high-grade deposits are worked—those containing 40 per cent. of sulphur—and over 50,000 metric tons per annum of sulphur comes from Hokkaido alone. Another important centre is Fukushima, with an output of 15,000 tons, and there are numerous smaller mines in operation.

About half the domestic demand for illuminating oil is met by local production; the balance is imported from the United States and Java. Oil was located in Echigo province a couple of centuries ago, but not until 1818 was any attempt made to sink a well. About 50 years ago the Japanese government sent one of its foreign mining experts to survey the field and report upon its prospects, but although there were ample proofs of large oil deposits nothing was done to develop the industry on modern lines before 1889. Until that time wells were dug by hand labor, and the crude oil was hauled to the surface by primitive hand pulleys. From 1890, however, the old order of things began to give place to new; foreign machinery of the latest pattern was imported and put into operation and a considerable amount of foreign capital (American) was sunk simultaneously with the new wells. Pipe lines were built to convey the oil from the fields to the refineries; new deposits of oil were found; in short, the oil boom had arrived. The wells vary from 300 to 2,000-ft. in depth, and frequently the oil—being held under pressure between impervious strata of rock—escapes with considerable force. The oil from some fields contains 50 per cent. of lamp oil, but other samples are of much lower quality.

The introduction of the rotary system of sinking wells has opened quite a new chapter in the history of the Japan oil industry, and, although the foreign interests have been long since bought out, the progressive methods which were introduced with the investment of foreign capital have been retained and extended.

Successful Lines

Copper wire, electric cables, and a very wide range of electrical goods are lines in which very rapid progress has been made. Antimony, aluminium, and enamel ware are other lines which have been well developed during the last few years. It is true that a quantity of very inferior goods has been put out on the export market during the last six years, which has made many suspicious of all goods made in Japan. Yet it is also true that many importers of Japanese goods—by taking precautions to see that their orders have been placed with reliable manufacturers—have handled very large consignments and disposed of them without the slightest complaint. That considerable damage to the reputation of Japanese goods has been done by careless—if not criminal—disregard of buyers' instructions admits of no doubt, but there are numbers of firms who have established a name for themselves as reliable manufacturers of all lines of metal goods, and business engagements entered into with such firms will be honorably carried out.

The Natural Resources of Zamboanga

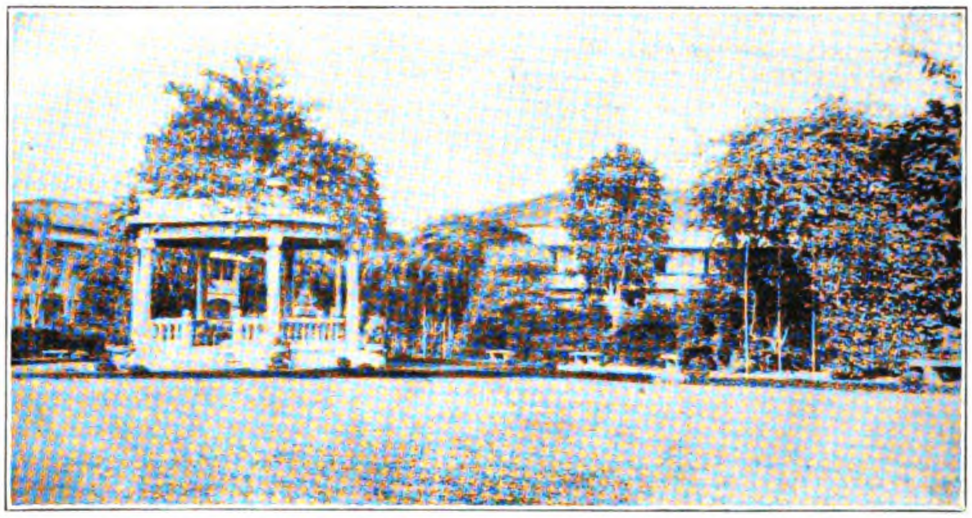
Opportunities for Development

By P. J. WESTER, Agricultural Advisor

ZAMBOANGA province includes most of the peninsula projecting east of Pangil Bay in the north and Illana Bay to the south, on the Island of Mindanao, and Basilan, Olutanga and some 146 smaller islands, and has an area of 6,383 square miles and a population of 146,846 inhabitants. Zamboanga is, therefore, larger than the states of Connecticut and Rhode Island.

Located between 121° and 123° east longitude, and between 6° and 9° north latitude, Zamboanga is bounded on the east by Misamis province, Pangil Bay and Lanao; on the south by the Celebes Sea; and on the north and west by the Sulu Sea. The coast line, approximately 700 miles long, is indented by several bays of which Sibugay, Dumankilas and Sindangan are the largest. Caldera Bay, Masinlok, Port Santa Maria, Panabutan, Talagilung, Sambolauan, Margosatubig and Port Banga are smaller but well protected bays with excellent anchorage.

Zamboanga peninsula is largely a mountain range, with several peaks rising to now and then 600 or more metres in height. Numerous short streams and rivers wind their way between the mountains to the sea, of which the Dipolog, Dapitan, Lubungon, Piau, Siokon, Sibuku, Vitali, Kumalarang, Kabasalan, Kulasian, Tukuran, Bakalan and Labangan are the largest and the most important. Many of these rivers could be utilized as a source of power for industrial purposes but all are too small and too shallow to be navigable for any but small river craft, and then only for a few kilometres inland, owing to the rapidly rising formation of the land.



View in Municipal Plaza, Zamboanga

Because of the mountainous character of the mainland, this part of Zamboanga is not well adapted to agricultural pursuits except in small, isolated valleys and pockets here and there along the coast, usually at the mouth of a river. The largest of these valleys are located at Dipolog, Dapitan, Lubungon and Sindangan. Then, the following rivers flow through smaller but also very fertile valleys:

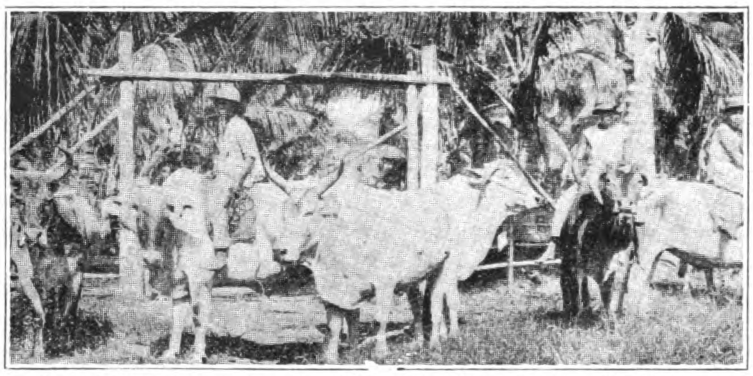
The Tukuran River, which empties near the Lanao boundary into Illana Bay and is navigable for six miles from the coast by small boats; the Labangan River, which empties a few miles east of the Tukuran River, which it exceeds in length and volume of water; the Kumalarang River draining Lake Danao and emptying into Dumankilas Bay; the Kabasalan River, which forms a small delta emptying at the head of Sibugay Bay, navigable for motor boats for about ten miles; the Bakalan River, navigable for a small launch for five miles from the coast; the Dinas River, that forms a marshy delta emptying into the sea in three arms off Pisan Island; the Sibuku River entering the bay of the same name on the west coast of the peninsula; the Siokon River flowing into Siokon Bay; and the Piau or Sindangan River, which empties into Sindangan Bay and is said to be navigable for small motor boats for ten miles from the mouth of the river. The basin draining into Sindangan Bay includes the largest single grazing area in Zamboanga province adapted to cattle raising. In the large, fertile Dipolog valley, the river is navigable by motor craft to Polanko and by smaller boats still further inland. The Dapitan river is navigable by launch to Ilaya.

The land formation of the Island of Basilan, the largest and the most important in the province, some 430 square miles in extent, located about 20 kilometres to the south of Zamboanga, the provincial capital, differs radically from that on the "mainland." The rise of the mountains is here so gradual that though several attain an elevation ranging from 300 to 1,020 metres, the greater part of the now heavily timbered slopes ultimately will be available for agricultural purposes when the lumber cutting now in progress is finished. Between the mountains lie several plains of unrivaled fertility of which the Lamitan plain, extending on both sides of Gubauan River and emptying into a shallow bay to the northeast; the Balaktasan plain, extending from Latuan to Isabela, centred around Balaktasan River, which really is only an extension of the Lamitan valley; and the Malusu valley, on the southwest of the river of the same name, are the most extensive. While the mountains are forested, the vegetation on the plains and on the lower slopes consists of secondary jungle growth and cogon, *Imperata cylindrica.* The soil varies from rich, alluvial deposits devoid of, or containing more or less laterite to volcanic ash; as a rule it is friable. Generally free of stones and boulders, again, in other localities these are present in such numbers as to seriously impede ordinary cultivation and render the employment of motor-drawn implements impracticable. According to the surveys of the bureau of forestry, Zamboanga has 1,320,233 hectares commercial forest, 78,924 hectares cogonales. Mangrove swamps and non-commercial forest cover 102,726 hectares, 31,906 hectares or 1.9 per cent. of the land is under cultivation, 119,408 hectares are still unexplored.

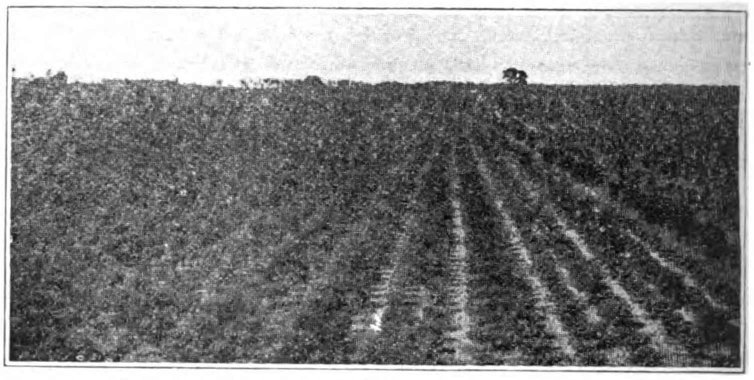
Climate

The rainfall of Zamboanga is quite varied, which in part may be seen from the following table adapted from the records published by the Philippine weather bureau.

Zamboanga has the lowest mean annual precipitation recorded in the Philippines. This condition applies, however, to a very circumscribed area adjacent to the city itself, and the rainfall is very much greater within a few miles of Zamboanga proper. In Dapitan the rainfall is more than double that of Zamboanga, in Isabela nearly so. Again, the rainfall table of the latter place, while probably representative of the coast line and valleys in Basilan, does not indicate the true figures of the precipitation in the interior, where the rainfall on at least some mountain slopes



Cattle and Coconuts make a Good Combination, Patalon, Zamboanga



Coffee and Coconut Plantation, Patalon, Zamboanga

at even less than 150 metres' altitude is twice that in Isabela, with still greater precipitation at the higher elevations. In the Margosatubig district the rainfall, which is very equally distributed throughout the year, is estimated at not less than 3,000 millimetres annually and it is probably considerably greater.

Population

As stated already on a previous page, the population is over 146,000 souls. A few of these are Americans and Europeans, mostly living in Zamboanga and representing commercial houses, or in charge of plantations. The Filipinos live principally in the Dipolog and Dapitan district and in and around Zamboanga, and are occupied by agricultural pursuits. The Moros inhabit the coast and the adjacent islands from Lanao on the south coast to Sindangan in the north, and gain their livelihood by fishing and farming, chiefly the former occupation. The Subanos inhabit the interior of the Zamboanga peninsula, and the Yakans inhabit Basilan. These two tribes are both very primitive and they support themselves by hunting and farming.

For plantation labor the Subanos are considered the best workers. Yakans are less efficient. The Filipinos and the Moros are engaged in their own pursuits and with few exceptions are not available for hire. Here as in all other provinces of the archipelago, the local trade is largely in the hands of Chinese. The Japanese settlers are few.

Arabian Coffee, 2 years old from Planting in the Field, Patalon, Zamboanga

Historical Review

To the American having in mind the rapid development of his own country, the old history of present-day Zamboanga seems almost inconceivable.

Dapitan passed under the yoke of Spain in 1565. Cinnamon, probably the kami, *cinnamomum mindanaense*, is recorded to have been exported in large quantities as early as 1598 from Caldera, which for some time previous had been a trading post. The first Jesuit mission was established in Dapitan in 1631. The earliest Spanish settlement in Zamboanga was made in 1635. Basilan was ceded to the Spanish crown in 1726, and the fort at Isabela was constructed in 1842. In 1831 the first custom house was established in Zamboanga. The city was occupied by the Americans in 1899 and Zamboanga was made a province and civil government established in 1914.

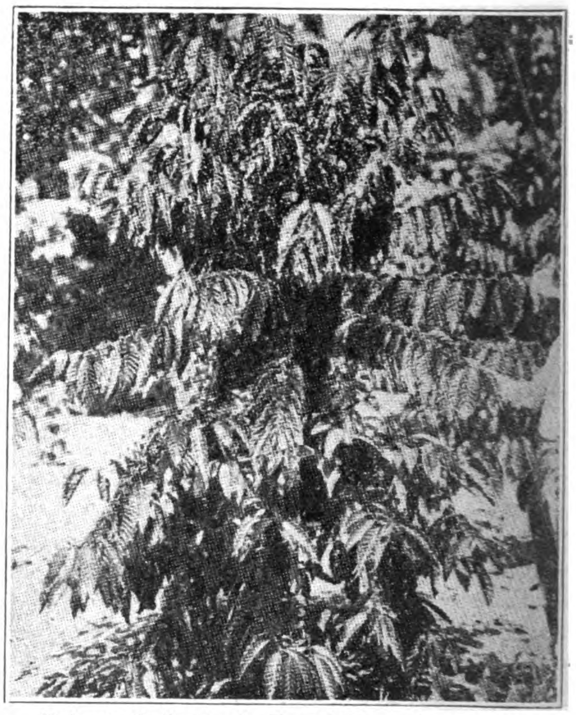
Agricultural Industries

Coconuts, rice, abacá, corn, rubber and coffee are the principal crops of the province, in the order named, and were, in 1918, planted in the following areas according to statistics compiled by this bureau:

Crop	Area, hectares	Quantity	Value *Pesos*
Coconuts	[a]20,560	[a]61,299	[c]9,183,638
Rice	4,020	[d]70,448	291,953
Abacá	4,799	[e]2,439	826,620
Corn	3,642	[d]37,243	201,935
Sugar cane	729	e537	76,065

[a] Calculated at the rate of 204 trees to the hectare.
[b] Copra, metric tons.
[c] Value of all coconut products.
[d] Hectoliters.
[e] Metric tons.

By far the most coconuts are produced in the settled country adjacent to Zamboanga, from Patalon in the north to Manikahan on the east coast. Smaller areas are planted in Isabela, Basilan, and in the Dipolog and Dapitan valleys, with scattered, small plantations here and there along the coast. In rice production Dipolog leads, which also is the principal abacá district. Zamboanga leads all provinces in the Philippines in rubber production. Considerable



Robusta Coffee in the Fourth Year after Field Planting, Patalon, Zamboanga

quantities of coffee is also being grown. The production of sugar, cacao, maguey and tobacco is insignificant.

The principal vegetables and miscellaneous food crops grown in Zamboanga do not differ very greatly from those in other provinces in the Philippines except that cassava is very extensively grown by the Moros. The other more important vegetables include: camotes, squash, pumpkins, upo, tomatoes, egg-plants, sitao, peanuts, gabi, ubi and cucumbers.

At San Ramon Farm a very great variety of temperate zone vegetables are grown very successfully. The production of Bermuda onions of excellent quality is especially worthy of note, considering that this item forms such an exceptionally high figure in the vegetable imports of the archipelago, in 1918 amounting to 4,702,912 kilos valued at P.331,883.

Plantations

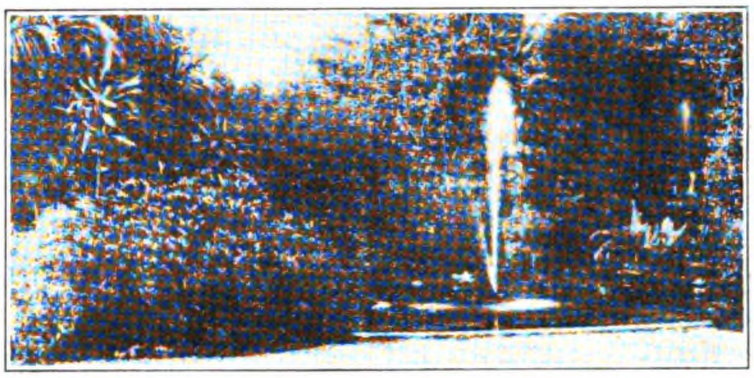
Aside from several more modest ventures, nine corporations capitalized at from P.50,000 to P.500,000, are engaged in developing plantations of coconuts, abacá, coffee and rubber from 230 to 1,024 hectares in extent. The most notable of these is the Basilan Plantation Co. with an area of 1,024 hectares, which is the pioneer rubber plantation in the Philippines and now has about 81,000 para rubber trees growing, and a large area planted to coconuts. Some 600 hectares are under cultivation on this plantation and the clearing of the remaining jungle has been delayed only because of insufficient labor. It is the success attained by this plantation that has induced other capitalists to later rubber ventures in Basilan and Mindanao. A modern rubber drying house 12 by 36 metres two stories high has been erected by this company within the last year.

The 17,000 para rubber trees on the Balaktasan estate, Basilan, acquired by Japanese in 1918, continue to make satisfactory progress.

The Patalon plantation, a few kilometres to the north of San Ramon, devoted to coconuts and coffee, is signally successful and is an eminent example of what can be accomplished in Philippine plantation ventures under good management. As coffee plantations go in other countries, the one at Patalon is, of course, a very modest affair, including only some 36,000 trees. Nevertheless, it enjoys the distinction of being at present the largest rationally cared for coffee plantation in the Philippines, and the first to definitely demonstrate that robusta coffee can successfully be grown in these islands. The soil being of a very patchy character, it has shown how wonderfully productive robusta coffee is when the soil conditions are what they should be for this coffee, but failure in other fields have strikingly demonstrated how unprofitable robusta is when planted under uncongenial conditions. Robusta and liberian are the two varieties principally planted, while several of the new, rust-resistant kinds are also being tried; the excelsa and quillou being especially promising. The liberian coffee produced is disposed of at P.94 and robusta at P.74 per 100 kilos in Zamboanga.

The American Plantation Company has made more rapid progress in development work than any other corporation during the past year. The concession of this company includes some 1,000 hectares of excellent land located on the Balaktasan river, a short distance from Isabela, Basilan. More than 500 hectares have already been cleared, of which a large area is planted to para rubber, and at the present rate of progress the entire tract will probably be occupied by rubber at the end of 1921. The American Plantation Company is the first concern to employ tractors in developing a plantation in this part of the Philippines.

A Herd of Carabaos, Philippine Islands



Corner in Municipal Plaza, Zamboanga

Natural Resources and Products other than Agricultural

The island of Basilan presents very great potential opportunities for agricultural development but the immediately available resources of the province are the large forests, which are exceeded in area and value only by those of Davao and Cotabato. The timber trees range from the soft lightwoods, such as lauan, *shorea* spp., *pentacme contorta*, *parashorea plicata* and *anisoptera thurifera*; lumbayao, *tarrietia javancia* and calantas, *toona calantas*; to heavy hardwoods, such as yakal, *hopea* spp. mancono, *xanthostemon verdugonianus*; ipil, *intsia bijuga;* molave, *vitex* spp.; pagatpat, *sonneratia scaseolaris;* camagon, *diospyros discolor*; d'nglas, *eucalyptus naudiniana*, narra. *pterocarpus indicus*; and tindalo, *cassia javancia* and *pahudia rhomboida*, of which the hardwoods are used for posts, piles, ties and cabinet woods, while the lightwoods are employed for light construction and interior finish.

Lumber mills are operated by the following corporations: The Basilan Lumber Co., with mills at Isabela and Malusu; the Olutanga Sawmill Co. with mill at Olutanga; the Mindanao Sawmill Co., with mills at Naga-naga and Margosatubig; and the Port Banga Sawmill Co., with mill at Bangaan.

Other forest products which are collected in greater or less quantities for export are almaciga, gutta-percha, cascalote (tan bark), rattans and beeswax, but the production of all could be greatly increased.

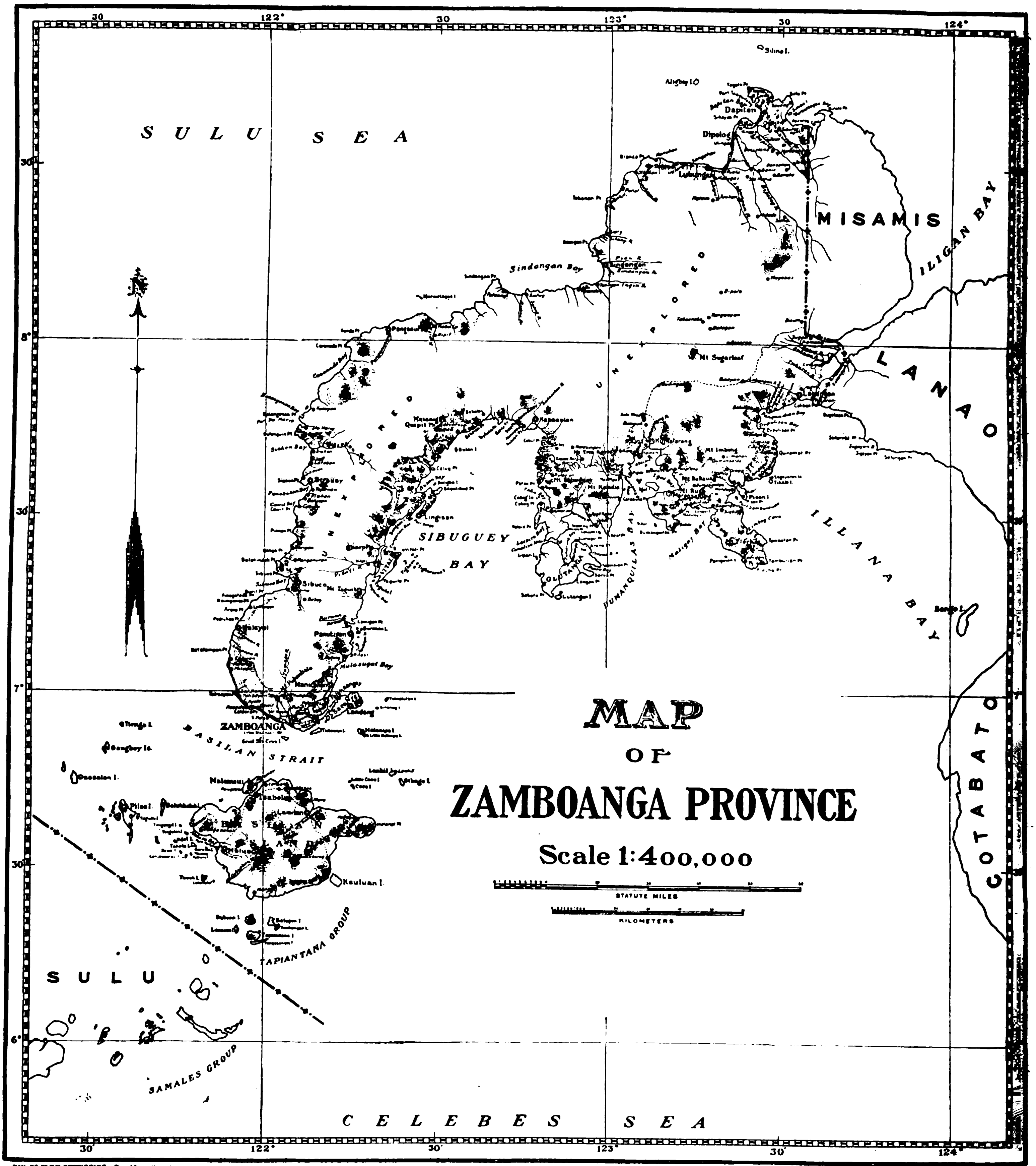
Coal of good quality has been known for a number of years to exist on the peninsula between Payao and Malangas, and the National Development Company, with headquarters at Malangas, has been occupied for nearly two years with surveys and other preliminary work incident to mining the coal deposits which are believed to be very extensive.

The marine products of Zamboanga include pearls and shells, the exports of which totaled P.81,943 in 1918. Small amounts of bêche de mer, shark fins, coral and sponges are also produced. Fish of excellent quality is plentiful in the markets at all times of the year. Salt is produced in Talontalon near Zamboanga for local consumption.

Zamboanga, the Capital

Zamboanga is the capital of the province which it has given its name.

With its balmy climate, clear, limpid skies, brilliantly blue water, the wonderfully colorful sunsets over the vast expanse over



the sea, the opulent vegetation, its tall, waving coconut palms, shady streets, and effects in decorative landscape gardening not forgetting turbaned Moros gay in their habiliments of bright colored cloth, the city of Zamboanga possesses a charm quite foreign to the seaports to the north in the Philippine archipelago. Violent storms are rare. So different from the islands in the north is, indeed, the general atmosphere of Zamboanga that here one might imagine oneself in a foreign country, more akin to Java and all that name implies.

Transportation and Communications

For connection with the outside world Zamboanga is served by several steamship lines. The Nippon Yusen Kaisha steamers plying between Yokohama, Hongkong, Manila and Sydney make Zamboanga a port of call. All inter-island steamers from Manila to Jolo, Cotabato and Davao, such as the *Islas Filipinas*, *Yazoo*, *Neil MacLeod*, *Albay*, *Fernandez Hermanos*, *D. Ildefonso*, *Mindanao*, *Raritan* and others call at Zamboanga on their way

to and from Manila via Cebu and Dumaguete. The *Tablas* provides monthly communication with the north coast of Mindanao as far as Butuan, touching at all the important points, such as Dapitan, Dipolog, Misamis, Kolambugan, Iligan and Cagayan, and at the less known points whenever there is sufficient cargo to warrant a stop; on the south coast calling at Cotabato, Lebak, and the Davao ports as far as Mati, and making occasional trips to Jolo, Cagayan de Sulu and Siasi, which as a matter of fact, is also done by the *Mindanao*. Theie are also steamers plying monthly between Zamboanga, Borneo and Singapore. Direct connection with Iloilo and other insular ports not mentioned is erratic and irregular and as a rule travel there from Zamboanga must be made via Manila. The U. S. army transports arrive monthly from Manila. Large and small launches handle the inter-provincial trade, while many sailing vessels touch there from domestic and foreign ports.

Zamboanga has direct cable communications with Basilan and Jolo, and with Manila via Cebu and Dumaguete; it also has a wireless station. The Zamboanga telephone system extends to San Ramon and Patalon on the one coast and to Manicahan and Buena Vista on the other. Dapitan is also connected by a cable with Cebu, and a local telephone system links up the settlements in the northeast corner of the province with each other and with the adjoining part of Misamis province.

A first class road has been constructed from Zamboanga to San Ramon on one hand and to Manicahan on the other, and a second class road is under construction from Isabela to Lamitan. Transportation between the different municipalities in the province is consequently almost entirely by water on the sea coast.

Trade

The foreign exports of the port of Zamboanga during 1918 amounted to P.498,187, while the domestic exports amounted to P.2,798,723, the bulk of which consisted of copra, lumber, abacá, marine shells and rubber, in the order named. According to the annual report of the bureau of customs the foreign imports for the same year amounted to P.1,354,051. These figures do not, however, represent the total imports and exports of the province. There were 44 entrances and 35 clearances of foreign vessels during the year, while 804 and 827 coastwise vessels entered and cleared respectively.

Foreign Trade of Japan for First Six Months of 1921

"JAPAN'S foreign commerce in the first six months of the present year registered roughly a 50 per cent. deciease in both exports and imports as compared with the corresponding period of last year," says American Consul Lester L. Schnare, Yokohama, in *Commerce Reports*. "One of the most radical factors noticed in all branches of trade is the decline in prices causing the whole trade to look very unfavorable. The decline as noticed in the volume of trade is not so notable." Thus the ministry of agriculture and commerce characterizes Japan's external commerce during the six months just ended in its semi-annual report, says the *Japan Advertiser*. The total value of Japan's external commerce during the six months reached Y.1,372,635,000 ($684,-258,547), according to the report, of which Y.574,817,000 ($286,-546,274) was exports and Y.797,818,000 ($397,712,273) was imports. The excess of imports over exports amounted to Y.223,001,000 ($111,165,999). Compared with the coriesponding period of last year the exports show a decline of 49.5 per cent. while the decrease in imports reached 50.6 per cent. The decrease in the total was 50.2 per cent. Every month's trade registered a decline both in exports and in imports, the rates of decrease ranging between 33 per cent. and 6 per cent.

A comparison of the six months' trade of 1921 with the corresponding pre-war period of 1914 follows:

	January-June, 1914.	January-June, 1921.
Imports	$190,792,899	$397,712,273
Exports	155,566,396	286,546,274
Total	346,359,295	684 258,547
Excess of imports over exports	35,226,503	111,165,999

As shown in the foregoing statement, the imports show an increase of 108 per cent. over the pre-war period and the exports an increase of 84 per cent. In the total there was an increase of Y. 677,831,000 ($337,899,252) or 98 per cent.

Trade Declines with Various Countries

In trade with Asiatic countries exports fell off 41 per cent. and imports 56 per cent. Japan's European trade fell off 84 per cent. in exports and 13 per cent. in imports. The North American commerce registered a decline of 53 per cent. in exports and 51 per cent. in imports. In the case of the South American trade the decrease in exports amounted to 86 per cent., while the decrease in imports was 93 per cent. In the Japanese-African trade exports decreased 83 per cent. and imports 92 per cent. In the trade with other countries, exports dropped 61 per cent. and imports 66 per cent.

When trade is examined in relation to individual countries, it is found that both exports to and imports from Germany and imports from the Straits Settlements, Siam, Belgium, Austria-Hungary, Russia, Portugal, Mexico and Peru registered gains, while the exports to and imports from all other countries in the world diminished more or less noticeably.

Representative Export Commodities Showing Decreases

In the export trade of the six months only two of 28 representative commodities registeied an increase. They were copper and beer, the former showing a gain of 62 per cent. and the latter 16 per cent. Below are given in the order of their relative importance to the total trade the 26 leading articles of export registering a decrease and the rate of this decrease for the last six months:

	Percentage of decrease.		Percentage of decrease.
Raw silk	40	Beans and peas ...	82
Cotton cloth ...	37	Tea	83
Silk cloth	58	Buttons	69
Cotton yarns ...	34	Coal	17
Refined sugar ...	72	Starch	96
Cotton hosiery ...	72	Hats and caps ...	77
Matches	62	Woolen cloth ...	78
Braids	80	Paper	19
Waste silk	78	Iron	61
Lumber	56	Portland cement ...	35
Glass and glassware	68	Leather manufactures	60
Toys...	71	Rice	37
Porcelain	42	Zinc	84

When the export prices of the more important articles are examined it is discovered that the average export prices were higher only in beer and rubber tires. In other articles the average rate of decline is 33 per cent. In some leading articles on the export list, such as raw silk, silk cloth, cotton yarns, and others, the decline in the average export prices is more than 50 per cent. This shows that the decline in the prices of individual commodities was one of the most important factors of the export trade of the term.

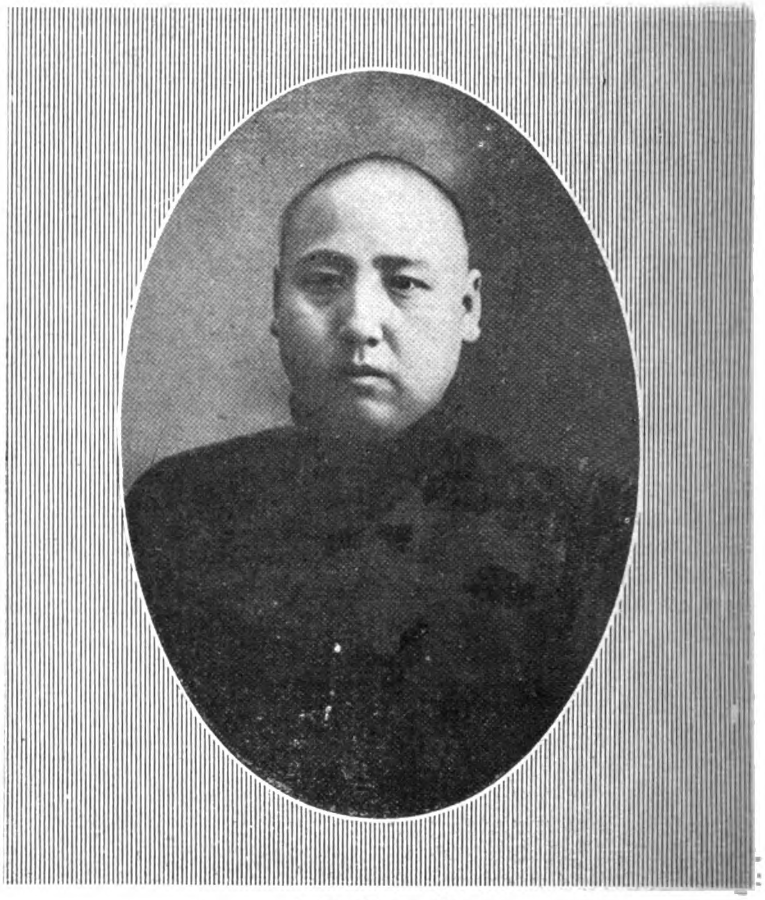
A Model Textile Factory in China

By VERNE DYSON

FROM the standpoint of engineering excellence, the cotton mill of the Heng Yuen Textile Company in Tientsin is noteworthy among China's latest industrial acquisitions. There is in this establishment an entire absence of all inefficient old-style methods and equipment. The factory sets a new standard in that it is modern in every particular in its housing, power plant and in all mechanical departments.

The first unit of the mill was built three years ago. There have been several additions, making a total of 30,000 spindles and 200 looms. The company, capitalized at $5,000,000, is a private corporation, founded and controlled by government officials. The president is H.E. Tsao Jui, civil governor of Chihli province. Mr. J. T. Chang is vice-president. The mill manager is Mr. J. M. Wang.

H.E. Tsao-Jui
Governor of Chihli Province, President, Heng Yuen Textile Co.



J. T. Chang, Esq.
Promoter and Vice-President, Heng Yuen Textile Co.

The products of the mill are sheeting, drills, light duck and heavy canvas. It specializes in the latter and in this field it is supreme, for there is no other mill in China which makes heavy cloth in quantity. Sheeting is used by the bulk of the Chinese race for its every-day clothes. The cloth is manufactured mostly in grey, and the retail consumer dyes it to suit his taste.

Drill is a firmer cloth than sheeting and, consequently, is higher in price. Most of the mill's output of light duck and canvas is purchased by the Chinese government.

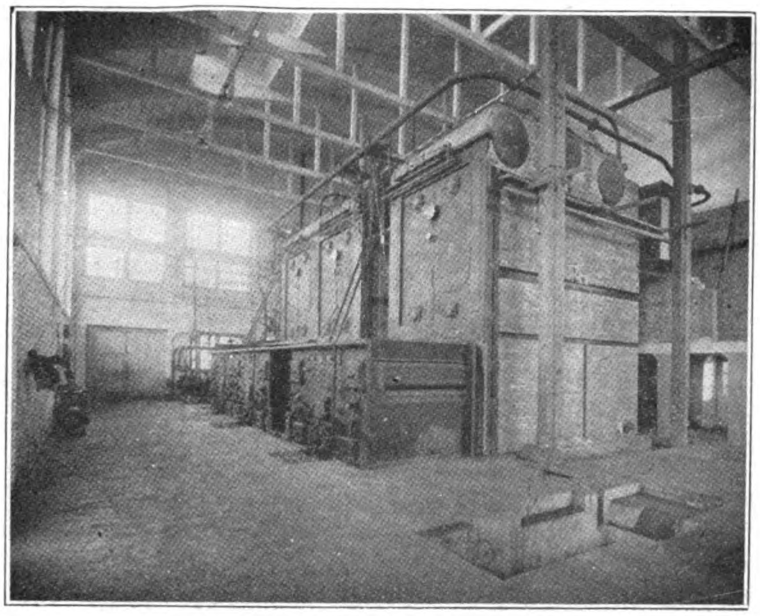
Light duck is needed by the government for army tents and for cartridge belts for the soldiers. This is the cloth which is used also for upholstering and in making tops for rickshaws and the sails of small craft. Canvas, or heavy duck, is the strongest of all cotton cloth, and its chief demand is for making large army tents and sails for the larger junks and other sailing vessels.

A general view of the mill from the outside reveals a compact series of one-story concrete buildings with rooves of the late saw-tooth style. The advantage of this sort of roof is that it gives an uniform distribution of light to all machines. The one-story type of buildings also afford a direct route for the passage of the cotton from the raw state in the bale through the process of becoming yarn, and on to the final finished cloth product without any carrying up or down stairs. The one-story factory building has advantages in its ventilation and other healthful features. While the single story structure is recognized as the best for factories, it is not always possible to follow this design in such places as Shanghai where land prices are high.

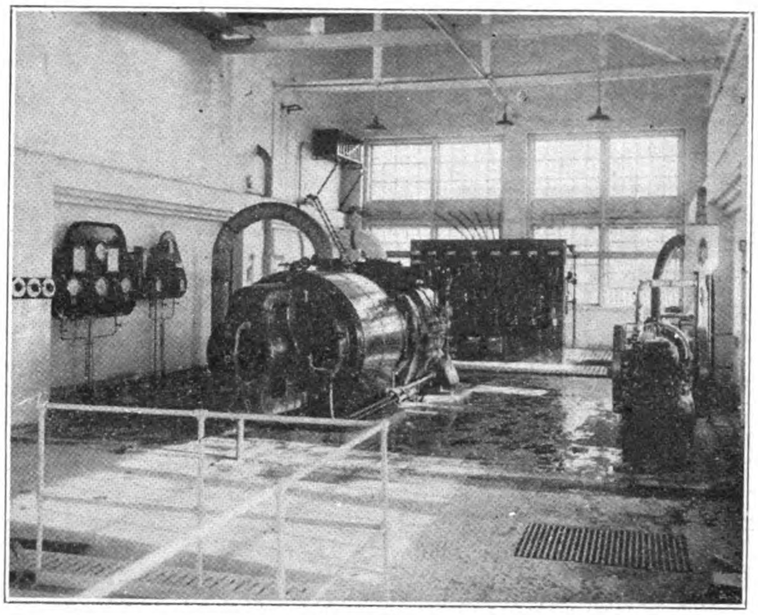
The complete equipment for the factory was furnished and installed by Andersen, Meyer & Co. In the power plant the General Electric Co.'s equipment was used throughout.

The power plant has a present capacity of 750 K.W. with 1,250 K.W. under construction. The power plant reaches a high ideal for it is isolated, well balanced, economical and developes electricity exclusively for the mill.

The vacuum system contributes extra efficiency to the steam turbine drive. The condensation of the steam into water produces the vacuum, giving to the turbine blades an extra high pressure. An "important minor detail" is found in the treatment of the steam pipes, which are scientifically covered with non-conducting material to prevent the leakage of steam through the joints.



Turbine Room
Present installation 1-750 K.W. General Electric Curtis Turbine



Boiler Room
Auxiliary Equipment

All the electrical standards are according to American usage, with 110 volts for lighting and 550 volts for power. All electrical wires are enclosed in flexible steel conduits, made by the Sprague Manufacturing. Co.

In following the course taken by the cotton, a tour of the plant starts in the picker room. Here occurs the preliminary processes of spinning. The picker room has three functions :

(1) The opening of the cotton. In the bale cotton is compressed until it almost solid.
(2) The cleaning. All foreign matter—dust, grit, twigs, etc.—must be removed.
(3) The making of the cotton into lap form.

In the picker room there is a noticeable improvement in the manner of transporting cotton from the bale breaker to the bins by means of galvanized iron pneumatic tubes. The old method of using wooden lattice conveyors, common in China, constitutes a serious fire hazard.

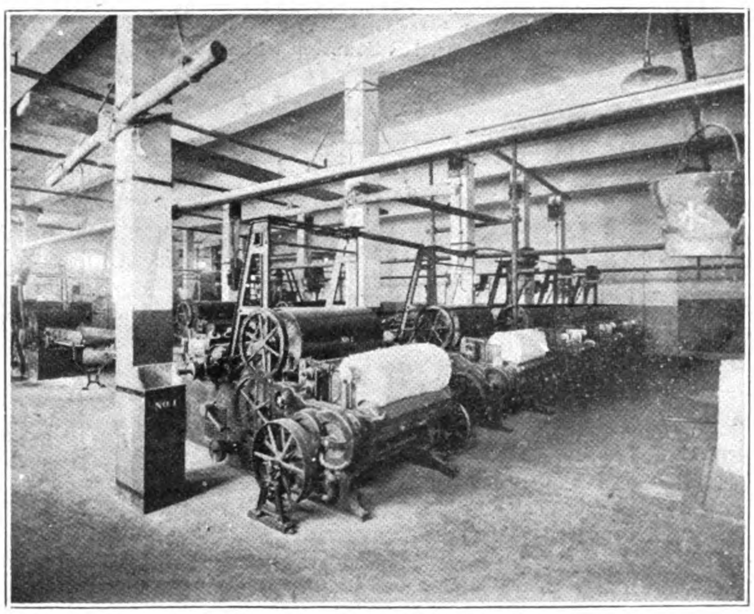
As a matter of conservation, the picker room is provided with special machinery for converting waste cotton and yard back into the original fibrous condition and mixing it with good cotton. The machinery in the picking room was made by the Kitson Shops of Lowell, Mass., which are controlled by the Saco-Lowell Shops.

The carding room next. Here Mr. Z. T. Zia, textile engineer for Andersen, Meyer & Co., who is conducting the tour, points out an important characteristic. It is the overhead humidifying system. To the novice it would appear to be an ordinary fire sprinkling system, but it is different. Each of the little "sprinklers" is an atomizer, operated by compressed air. By means of the ducts, the air in the room is kept in a moderately damp condition. Cotton handles better if it is slightly damp.

In the carding room the cotton first goes to the carding machine proper. The card is considered an important department of the mill for here the cotton is deprived of the last particle of foreign matter, and is reduced into rope form.

The second process begins in the drawing frames where six of the cotton ropes from the card are combined into a single strand, which makes the "roving" much more even and places the single cotton fibres side by side.

PHOTOS TAKEN AT THE HENG YUEN TEXTILE CO.'S MILL



No. 1 Picker Room

Spinning Room
General Electric Co.'s Motors used throughout entire Mill

At the third stage, the cotton roving goes through three successive machines by which it is drawn finer and finer to the required size for the next process—spinning.

Unmitigated evils of old-style factories are the shaftings and hangers. Particularly are they a handicap in the spinning room of a cotton factory, restricting the light and dripping oil on the floor.

Not a shaft or hanger is in sight in the spinning room of the Heng Yuen plant. Modern engineering has eliminated them completely. Here the spinning machinery is driven by electricity, with one motor for every four spinning frames.

The treatment of yarn in the Heng Yuen plant differs somewhat from that in most of the spinning mills in China. Since the finished product here is a heavy duck, or canvas, ordinary yarn is combined into ropes of three or four ply by the twisting machines.

From the winding and twisting department the reinforced yarn goes to the only reeling room in North China which is operated by mechanical power.

In the weaving department we found one hundred Draper sheeting looms, and one hundred Crompton and Knowles duck looms. This division is admirably lighted.

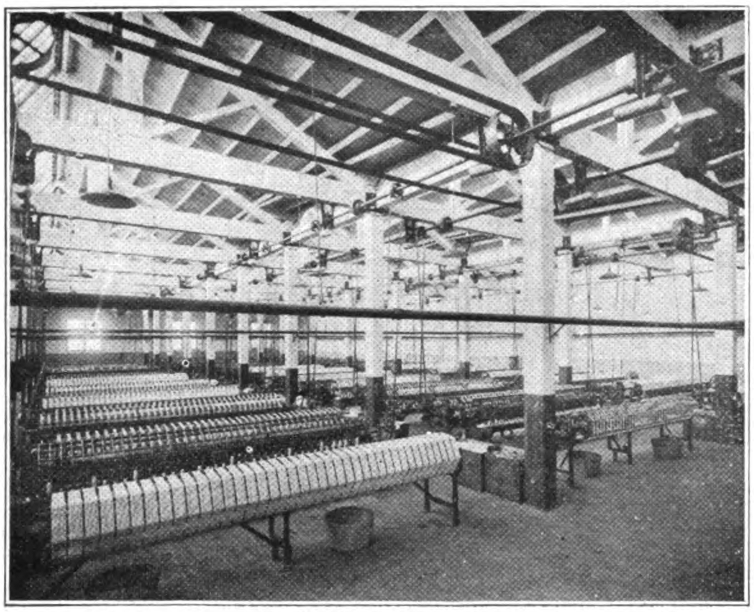
Now that the Heng Yuen factory has taken its place as an inspiring example of the best mill construction, questions are vanishing. Its influence for good is becoming recognized. It points out an important commercial fact which has long been recognized by the weaving industry in England and America: i.e., that the excellence and the economy of production depend on the right kind of mechanical equipment, rightly installed and rightly managed after it is installed.

The prominence of scientific engineering is noted in the different advancing industries. In this particular the Heng Yuen plant is distinctive among other Chinese cotton mills. From first to last, the factory is the product of experts.

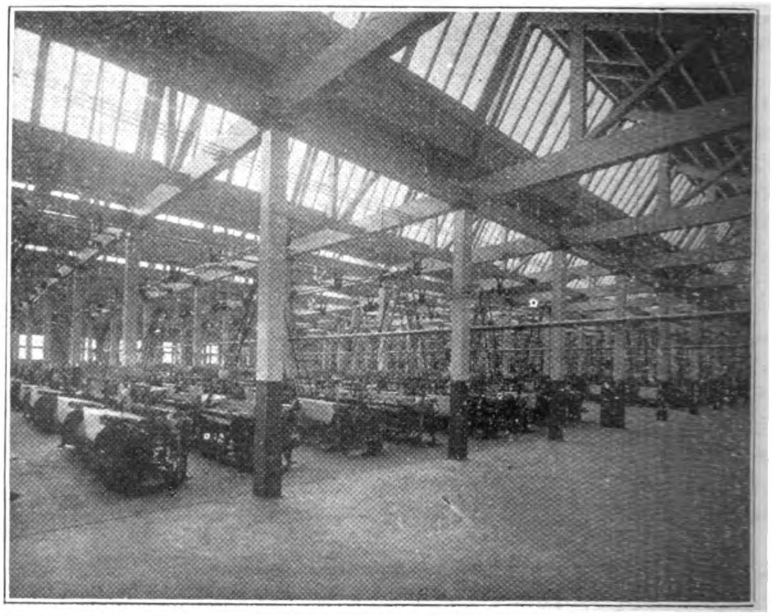
Aside from the question of mechanical equipment, there is another encouraging characteristic in the mill's policy of specialization. Mr. Zia points out:

"At first most of the cotton mills in China produced only yarn. Recently, they have begun to follow the best practices in the mills of America and England, and are specializing. There was a marked shortage in the Orient of the heavier grades of cotton cloth—duck and canvas. This material was needed by the Chinese government in quantity for army tents and other military uses; also,

TWO VIEWS AT THE HENG YUEN TEXTILE CO.'S MILL



Reeling Room
The only reeling room in North China operated by Power



Weaving Department
100 Draper Sheeting Looms, 100 Compton and Knowles Duck Looms

it was greatly in demand to make sails for ships. Here was a well-nigh unlimited market waiting for a mill. The Heng Yuen Textile Company is improving this trade opportunity. It has specialized in duck and canvas. Consequently its products are sold before they emerge from the looms."

The Saco-Lowell slasher and sizing system is used. The sizing machine is an immense thing, towering up to the ceiling. In the cloth room, Curtis and Marble cloth room machinery is used.

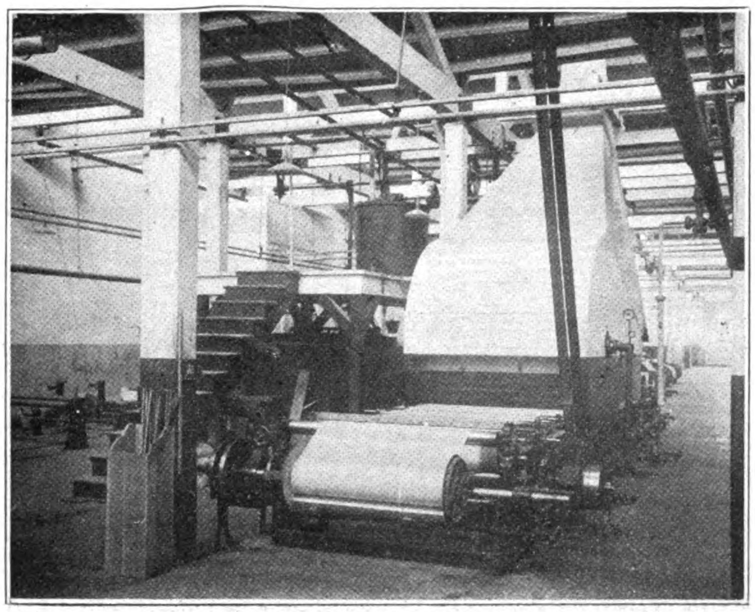
While the Tientsin plant is not the largest or most expensive cotton factory in China, it is one of the most interesting of the country's 102 mills. The Heng Yuen factory is a gem of an industrial plant, in that excellence was striven for in every engineering feature, large and small.

From the inception of the enterprise, the question of expense did not stand in the way of obtaining the best of any particular equipment that the machinery market afforded.

At first some of the conservative Chinese capitalists in Tientsin were inclined to regard Governor Tsao and Mr. Chang, the promoters, as extravagant. Very frequently when an industrial plant has been established in China there has been an effort to save money at the expense of some one department. For instance, a mill promoter would buy the latest and best weaving machinery, and then install an old-style, inefficient power plant, or he would place modern equipment in a poorly-lighted building.

Conditions in China at the moment, viewed from the political and economic standpoint, appear rather hopeless. Observers are turning toward commercial development for optimism and are finding it.

"What greater faith in themselves or in their country could a group of Chinese show than in placing a capital of $5,000,000 in an industrial plant, such as that of the Heng Yuen Textile Company?" a Tientsin taipan inquired. "The model plant is distinctive, encouraging and points a hopeful lesson for the downhearted because—it stands for an idea that is spreading through China—the belief that national salvation and stabilization must come through improved commercial, financial and engineering methods, and let the tuchuns fight it out until they destroy each other and get out of the way of big business."



Saco Lowell Slasher and Sizing System
Heng Yuen Textile Mill

Cloth Room at the Heng Yuen Textile Mill
Curtis and Marble Cloth Room Machinery

A Short History of Aviation in China

IN the second year of Hsuang-Tung of the Tsin dynasty (1910) the general staff at Peking selected a place about ten miles from the south suburb of Peking, known as Wu-Li-Tieng in Nanyuan, for establishing an experimental flying field. The plan of this work was a simple one and yielded little efficiency. In the same year a Russian pilot made a flying exhibition with a Bleriot monoplane at the legation quarter, Peking. In the next year Mr. Valoon, a French aviator, flew with a Sommer biplane in Shanghai. He unfortunately was killed by accident.

During the revolution of 1911 the revolutionary leaders planned to attack Peking from the air. They ordered two Etrich monoplanes from Austria which arrived at Shanghai in the following year when the revolutionary turmoil was entirely over. About that time Mr. Li Zu-yin, who had just returned to China from England, made several flights in Shanghai. While in Canton Mr. Feng Juh was accidentally killed in a flying exhibition. In 1912 Mr. Li brought the two Etrich planes to Nanking and finally moved them to Wu-Li-Tieng.

In the meantime the general staff established a flying school at Nanyuan (which is now known as the Nanyuan Flying School). For the flying practice of students, twelve Caudron biplanes were bought. A factory was also established for the purpose of repairing aircrafts. The instruction staff of the school consisted of a Chinese and a French instructor who were assisted by two French engineers. Later the aircraft factory was amalgamated with the school. Since then the aeronautical training for students has never been neglected in spite of the difficulties of the importation of aircraft materials during the European war. At the end of 1918 about one hundred students were graduated from the school, of whom fourteen had passed examinations in military aviation and had flown over a distance of four hundred kilometres. In military engagements aeroplanes were then in active use, such as in the suppression of the "White Wolf," the relief of Mongolia and the attempted Manchu restoration of 1917.

Early in 1916 the board of navy began to draw its attention to naval aviation. Accordingly the Fuchow Submarine and Flying School was founded in the vicinity of the Fuchow dockyard. Mr. Chen Shao-tsiang was in charge of the school. Its faculty consisted of several students who had returned from America upon completing flying training. As the school was near the naval bureau, the machines of the bureau could be easily put at its disposal. With this advantage the instructors made several sea-planes for training purposes. Unfortunately, the first plane, when tested, was wrecked owing to motor trouble.

In the winter of 1919 the aeronautical department was established to control all the air services of the country. Contracts were signed with the Handley Page and Vickers companies, by which the government promised to buy from the companies not less than 150 aeroplanes for training and commercial purposes and to employ foreign experts as pilots and instructors. In the spring of 1920, Colonel Holt, recommended by the British air ministry, was engaged as a technical expert to the department for a term of two years.

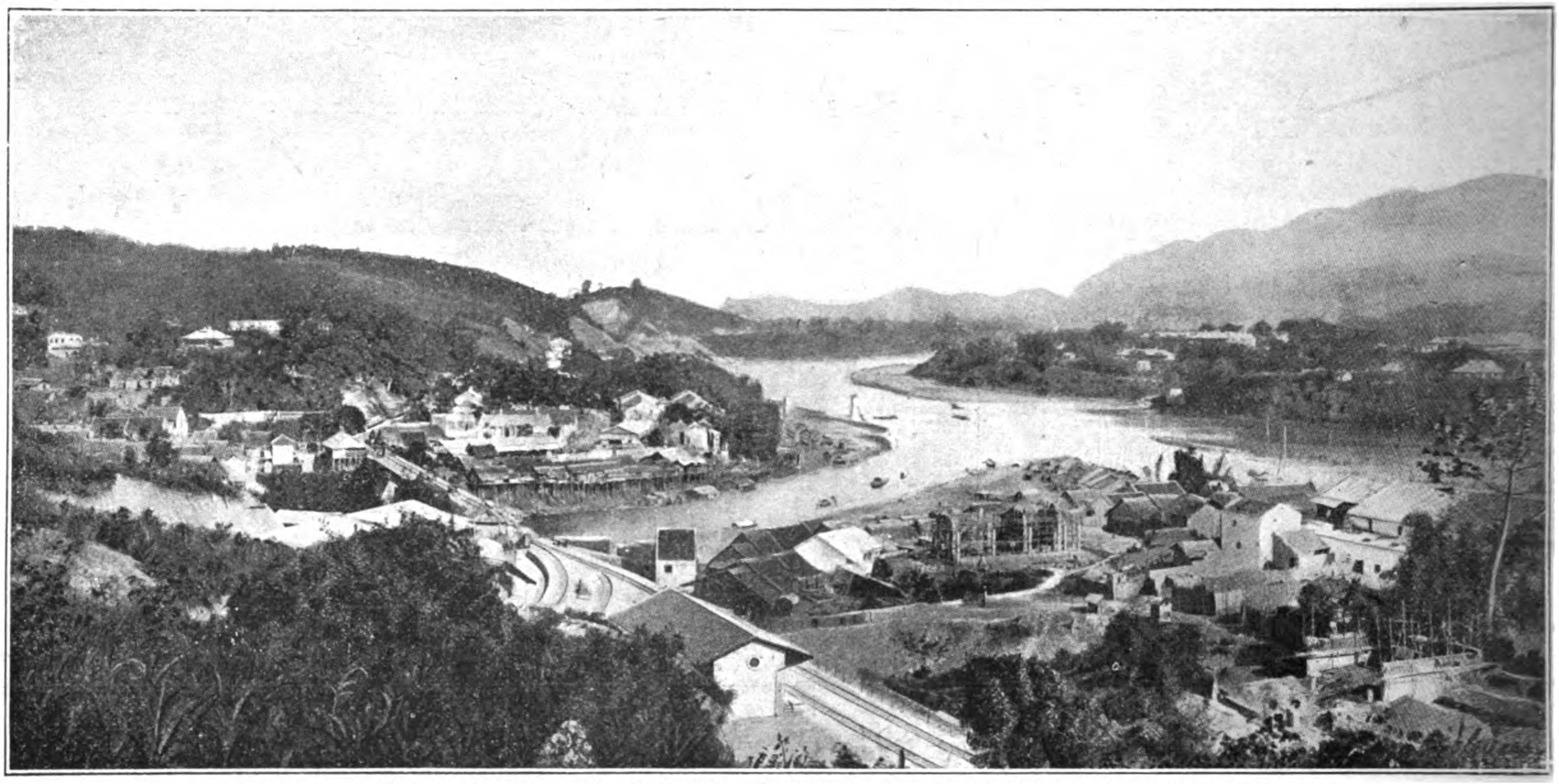
Prior to the fall of 1919 there were two organizations for air administration, one was the preparatory aviation bureau known as Han-Kung-Shi-Wu-Chu, and the other was the aviation department in the ministry of communications. In the autumn of 1920, however, both of these organizations were amalgamated by a cabinet order into the present aeronautical department.

Since the reorganization of the aeronautical department, the administrative works have been increasing every day. While General Ting, the director of the department, controls all the affairs, its works are directly supervised by the premier. Two of its accomplishments in commercial aviation are worthy of notice, one the air route between Peking and Nanyuan, which was started on April 2nd, and the other is the establishment of the Peking-Shanghai air line, which will be completed when funds permit.

Progress is slow on the Peking-Shanghai air line, which consists of six sections—Peking, Tientsin, Tsinanfu, Nanking, Hsuchow and Shanghai. Between these different stations it is contemplated establishing several landing fields. Pending the completion of the airdromes at the above-named stations, the aeronautical department of China has established a school for air service administration in order to provide administrators for the airdromes. Students of the school are chosen from among the members of the aeronautical department and graduates of the Nanyuan School of Flying. The number of students is 30, and the courses of study which will be given them will embody only necessary and elementary knowledge in air service administration and will be finished in three months. After graduation the students will be sent to the different airdromes.

The Nanyuan aircraft factory has been removed to Tsin-Ho, and 20 Avros and 24 Vimy planes have been transported to the latter place for service in connection with the Peking-Shanghai air line.

The aeronautical department has issued an order to the effect that the flying personnel will be subjected to a medical examination every six months. The first examination this year was held in April.



Panoramic View of Laokay on the Indo-China-Yunnan Border, the terminal of the Yunnan Railway

The Yunnan Railway

THE official report of the Yunnan Railway for the year 1919, recently published, shows that the receipts for the year from all sources was $3,030,631.88 against $2,791,978 for 1918, including the sums collected from the Chinese government for the transport of troops and military supplies, amounting to $3,957 in 1918 and $2,110 in 1919. Reduced to francs the receipts show 16,727,094 francs for 1919, and 11,945,777 francs for 1918.

If the normal tariff had been constantly applied, the receipts would have totaled $5,515,729 in 1919 and $4,235,594 in 1918, or an increase in 1919 of 30.2 per cent. over 1918, and an increase of 31.4 per cent. in that year over 1917. If it had not been for the important diminution of the tariff due to the enhanced value of the piaster, the increase would not have been so great, especially as regards the passenger receipts in Tonkin where the increased traffic returns are due, in the main, to the low value of the piaster.

Passenger Traffic.—The total number of passengers carried was as follows:

	1919.	1918.
1st Class ...	7,756	5,848
2nd " ...	14,106	10,919
3rd " ...	120,541	79,352
4th " ...	4,225,270	3,292,282
Total...	4,367,673	3,388,401

This shows an increase of 32.6 per cent. over 1918 for 1st class, 29.2 per cent. for the 2nd class, 51.8 per cent. for 3rd class and 28.3 per cent. for 4th class. An examination of the traffic movement shows following for the Haiphong-Laokay section of the line (the section the within Indo-China), as

	1919.	1918.
1st Class ...	7,367	5,548
2nd ,, ...	12,983	9,544
3rd ,, ...	110,527	64,204
4th ,, ...	3,131,834	1,946,495
Total...	3,262,711	2,025,791

which discloses an increase of 32.8 per cent. over 1918 for 1st class traffic, 36 per cent. 2nd class, 72.1 per cent. 3rd class and 60.9 per cent. 4th class.

The traffic on the Hokow-Yunnan section, which traverses the Chinese province of Yunnan from the Red River to the capital, was as follows:

	1919.	1918.
1st Class ...	389	300
2nd ,, ...	1,123	1,375
3rd ,, ...	10,014	15,148
4th ,, ...	1,093,436	1,345,787
Total ...	1,104,962	1,362,610

which shows an increase over 1918 of 29.7 per cent. in 1st class, a decrease of 18.3 per cent. in 2nd class, 33.9 per cent. in 3rd class and 18.8 per cent. in 4th class traffic.

This falling off in the Chinese passenger traffic is due to different causes, notably, the partial shutting down of the Kochio tin mines and the uncertain political situation, to brigandage, and also to the increase in the price of 4th-class tickets, which, for three months during 1919, was .0078 per mile, for five months .0071, and for two months, between .00585 and .0072, while during 1918 the tariff remained fixed for 11 months at .0048 and only one month did it reach .0078 per mile.

Railway Station at Hanoi, Tonkin

Tropical Geology and Engineering in the Philippines

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THE purpose of the present paper is to discuss, first, the general geologic processes as they are found at work in the tropics, contrasting their effects with the same processes in the temperate regions of the earth ; and second, to cite some examples showing their practical bearing upon the engineering problems that arise in those regions.

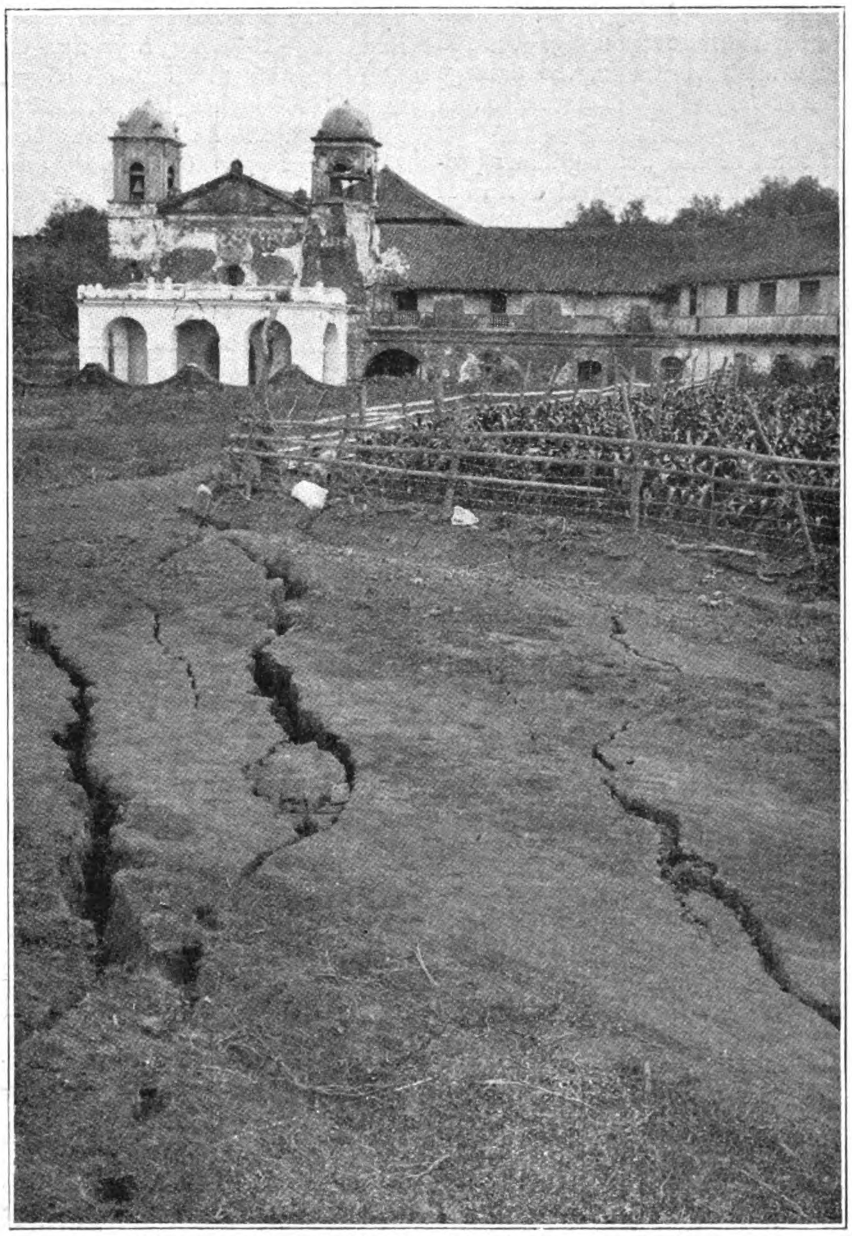
Previous to our experience in the Philippines, Cuba and Panama, Americans had had no extensive contact with the tropics and consequently many of our engineering data were found untrustworthy when applied to wholly new and unusual conditions. An especially good example may be cited in the location of our highways and railroads. In the United States we run a railroad line up one cañon, over the pass, and down the other side by way of another cañon. This has been tried in the Philippines, notably in the Benguet Road ; the result is that this road may have to be abandoned because of excessive cost of maintenance. In the tropics, during high water, there is room for but one thing in a valley and that is the stream which occupies it ; such a feat of engineering as that which has made the Royal Gorge and the Denver and Rio Grande Railroad famous is absolutely out of the question in the tropics.

There is one cardinal rule to be laid down at the outset, namely, take nothing for granted; investigate each problem separately. Handbooks and set formulæ are worse than useless; they are dangerous.

Geological Agents

The three most important geological agents are diastrophism, vulcanism and gradation. The last has four important contributing factors to be considered ; namely, a, weathering; b, transportation; c, corrasion ; and d, corrosion.

Diastrophism.—The first of these, diastrophism, denotes the up-and-down movements in the outer shell of the earth. Such movements are negligible apparently in the older and more stable parts of the earth, but even there they occasionally manifest themselves as earthquakes. In the newer parts of the earth, and particularly along continental borders, they are of considerable magnitude and importance. As it happens, many of these places are in the tropics. This is true of both Panama and the Philippines. Once before, and perhaps twice, the barrier of the Isthmus of Panama, which has cost so much in life, labor and money to cut through, has been opened so that the waters of the Atlantic and the Pacific intermingled, and it is not at all impossible that future diastrophism will render all our labor useless. However, these movements are so slow as to be almost negligible in any one generation. Only the geodesist finds that he has to readjust some of his calculations. We see the results in many parts of the world of such movements, but as yet we do not know much about them. Our data are not sufficient. Two facts are established, however; namely, that such movements as have taken place in the Philippines have been great during the late geological periods, amounting to as much as 1,800 metres, and that they have been differential. There has been within the recent period a marked tilting of the Philippine block toward the Pacific Ocean. This will explain to the engineer why we have comparatively shallow river mouths on the west side of the archipelago, and deep, drowned ones on the eastern side. It should be stated that in some parts of the archipelago, notably Cebu, the reverse is the case, which further substantiates the statement.



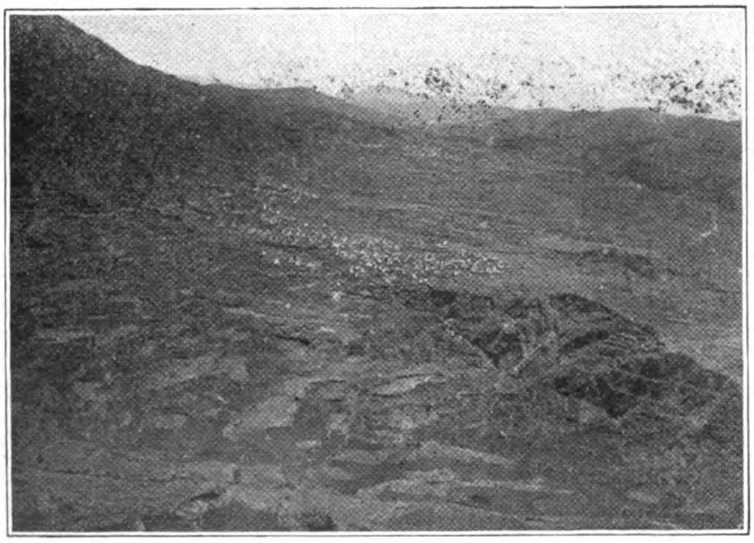
Fissure and Damaged Church at Taal, Batangas Province

Vulcanism.—As the Philippine archipelago is a part of the so-called

"Circle of Fire" that girts the Pacific Ocean, we naturally expect vulcanism to be of such magnitude that engineers would be continually anxious. Nevertheless, except for those regions in the immediate vicinity of active volcanoes, little damage has ever been recorded from this cause. The most-marked effects were those noted in 1911 resulting from the explosive eruption of Taal Volcano, situated about 45 kilometres due south of Manila. Had there been a large city (the size of Kingston, Jamaica, for example) situated on the shores of Lake Bombon, tremendously greater loss of life and damage might have occurred. The town of Taal, a few kilometres distant, suffered to the extent that an old church made of volcanic tuff was badly disfigured and a triangular section of land, crossed by one of the government's new highways, dropped about a metre, allowing the tide to come inland for perhaps four-fifths of a kilometre. The length of damaged road amounted to about 3 kilometres. These effects were due directly to earthquakes and indirectly to the volcano. Although four hundred ninety-eight distinct shocks were recorded in Manila at the time of the eruption, practically no damage there was noted. The claims of a certain American firm dealing in a patent type of concrete construction, that none of its buildings had suffered any damage at the time, were strictly correct, for no buildings in Manila were damaged!

Another instance in which vulcanism did play an important part was that in which a section of road in Albay province, Luzon, was obliterated for a distance of 3 to 5 kilometres by a fall of bombs and a deluge of mud and ashes from Mayon Volcano in 1915. As volcanic activity in the recent period in the Philippines has been entirely of the explosive type in which no lava outpourings occurred comparable to those from the Hawaiian volcanoes, the damage resulting to public works would be of very different character and also less serious.

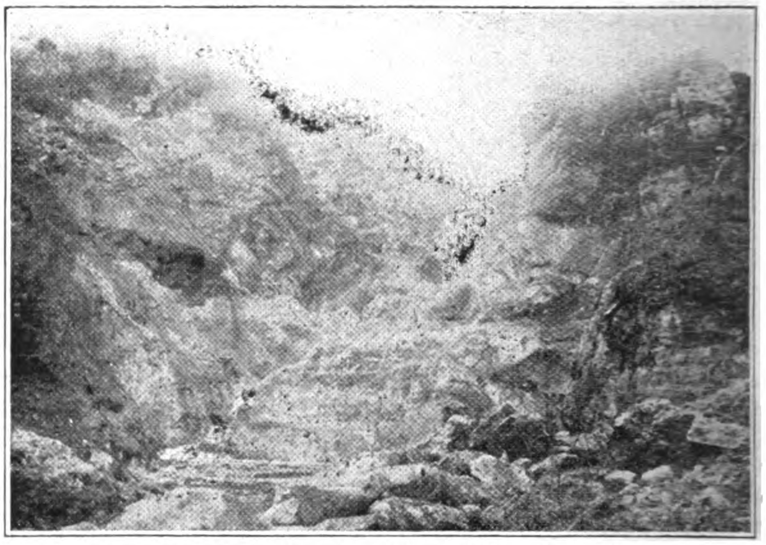
Gradation.—This is the sum total of the wearing-down process, in many respects the dominant type of geological work. If we analyze this process we find that the following agents are contributory: *a*, weathering; *b*, transportation; *c*, corrosion; *d*, corrasion. I would, however, make "corrosion" a subheading under weathering, there being two factors involved; namely, a mechanical deformation and a chemical change, either of which may precede the other. Once weathering, or to use a very crude term defining it in part only, "slacking," has taken place, transportation comes in and does its work; and then "corrasion," or mechanical wear, becomes operative, but not until there is movement.



Town of Balugan seen from the Train. Balugan, Bentee

Of course, these factors are operative in all countries and under nearly all conditions, but gradation proceeds at a maximum rate in the tropics. Two reasons are given for this; namely, rainfall and temperature or, in a word, climate.

In the Philippines we have a mean annual rainfall of well over 2,540 millimetres (100 inches), with sometimes exceptional and almost unprecedented precipitation, notably 1,168.1 millimetres (46 inches) in twenty-four hours on July 29, 1911, at the



Osmona Water-works; site of dam., Sebu. After Baguio

Baguio Observatory. This is, as far as we know, the world's record for a single rainfall. The reported rainfall of 23,387 millimetres (905 inches) a year at Cherraponji, in Assam, has lately been questioned. However, a precipitation of over 15 240 millimetres (600 inches) has been recorded on Mount Waialeale, Kauai Island, H. T. At such times the streams leave their banks and spread out over the country in sheets of water. Needless to say, the amount of material then transported is almost unbelievable. Furthermore, we have another factor to consider, and that is velocity. Often this is not taken into consideration. When we stop to consider that doubling the velocity of a stream means increasing its transportation power sixty-four times, we realize what a power we are trying to combat. We shall return to this topic.

Once the tropical downpour of warm rain has stripped off the soil, weathering can and does strike deeper into the core of rocks beneath, and however far we go underground in mine workings we find the rocks exhibiting incipient decomposition. The writer knows this to be true from the examination of a great many thin sections of wall-rock from the deepest mines in the archipelago. Undoubtedly the presence of organic acids, resulting from the decay of the rank tropical vegetation, hastens this decomposition. Of course, we have little or no frost, except in the highest mountains, but we do have wide ranges in temperature during the twenty-four hours and this adds to the disintegrating forces at work. Therefore, all things considered, we have reason to think that gradation, which includes degradation, is the most potent of the geologic processes at work in the tropics.

This excessive weathering in tropical regions, where andesite and basaltic lavas are to be found, has resulted in places in the accumulation of a formation, of considerable thickness, known as laterite. This is an aluminous soil or heavy clay, also rich in iron. When the iron exceeds 35 per cent. it can be used as an ore. Vast deposits of laterite are known in India and Cuba, and some years ago an American engineer discovered a commercial deposit of this in northeastern Mindanao, in the Philippines. A study of this deposit shows that it is a product of weathering and concentration.

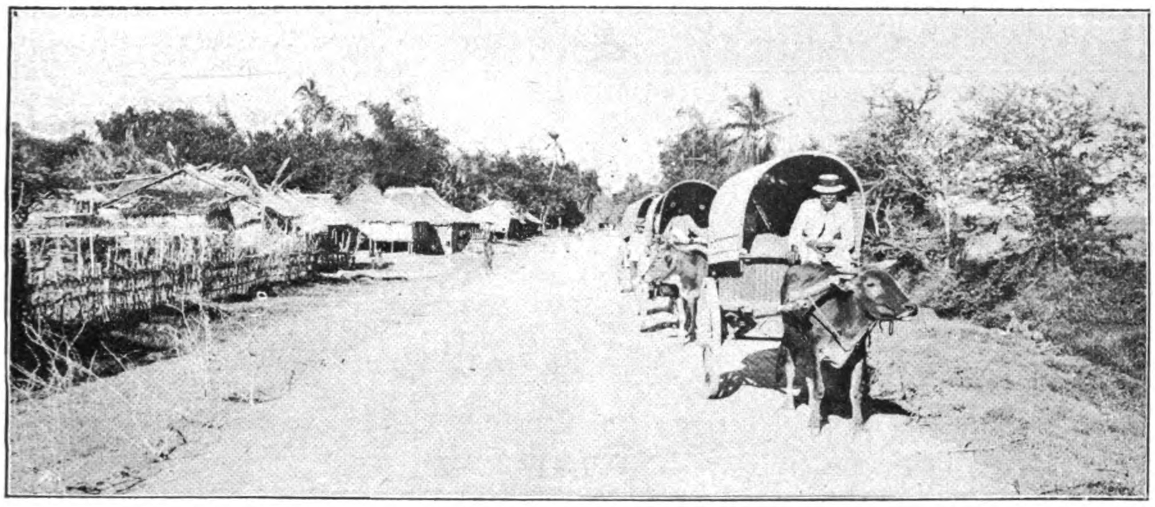
The Work of Organisms.—Nothing has been said as yet about the destructive work of plants and animals in the tropical regions, as the writer has made little personal study of the subject. There is no question but that they play no inconsiderable part in the processes of weathering and on occasion have to be reckoned with in engineering operations. We have but to call attention

to Branner's * observations on the geologic work of ants in Brazil to remind the reader of the importance of these insects. Not only do their numerous mounds, in some cases exceeding 5 metres in height, considerably alter the topography, but they seriously undermine the subsoil so as to endanger structures. They promote weathering by opening the formations to the atmosphere and to gases. The writer has seen many ant hills in the Philippines, but none commensurate with those in Brazil, described by Branner.

The writer's attention has just been called to the very interesting investigations of Oshima † on Formosan termites wherein he states that *Coptotermes* formosanus secretes a milky, acidulous fluid which dissolves the lime in the mortar of brick buildings. In order to protect the buildings he advises the construction of a concrete basement floor which shall have as few seams as possible.

It also appears from such studies as have been made that certain termites occupy in the tropics a place analogous to that filled by the common earthworms in temperate regions.

An instance of the work of winds and plants in combination may be of interest. In the recent destructive typhoon which struck Manila with such force (September 1, 1920), a great many of the fine acacia trees, which are the principal shade trees of the city, were uprooted and many sections of cement sidewalk were badly damaged as a result. These trees have widely ramifying and very shallow roots, with no tap root; consequently, with their wide-spreading tops, they became easy victims of the storm.



A Street, Mangaldan, Pangasinan

Corals.—The role that corals and coral reefs play in matters of engineering and the economic development of a country cannot be overlooked. We have already alluded to the connection between coral formations and water supply. Coral limestone is a very important source of construction material. In certain other ways coral formations are of great importance. For instance, the fringing reefs protect the shore from storm waves; also, they afford a firm foundation for future land when covered with earth, either naturally or artificially. Most of the coastal plain tracts in the archipelago have a coral foundation which is much more stable than is mere alluvium.

Structure

Much has been written in the textbooks about structure, and most engineers are probably cognizant of the importance of this branch of geology, but as yet little has got into the literature concerning this subject in tropical regions. Naturally an engineering feat of the magnitude and importance of the Panama Canal would necessitate a most careful regard for anything which might have an effect upon both the task of construction and the permanence of the canal. It is not the writer's intention to allude to any of the work of the canal commission geologist ‡ further than to advise any engineer who is working, or expecting to work, in tropical regions to give this important work considerable study.

In the Philippines we have the same sort of structures found in many parts of the world with the difference that here some of the structures are not only of recent origin but are still in the making. Where dynamic forces are at work the engineer cannot afford to be off his guard or ignorant of how they are to be recognized. The builders of the Los Angeles (California) aqueduct have very wisely studied and provided against the possible breaks which might interrupt that system, having been forewarned and forearmed by a geological study of the region, a region traversed by long parallel faults in the strata.

Faults.—In the Philippines there are many faults, some large, some small, which every mining man knows about. Does the civil engineer know about them? Can he recognize them? Are they old ones where movement has long since ceased or are they fresh and is movement likely to recur, and how will that movement be manifested? Which part will move up and which down? Is the fault normal or thrust? It makes a great deal of difference which. It can be readily seen that when it comes to railroad tunnels and water mains this becomes a serious matter. Cebu Island, for example, is apparently broken by a number of faults of considerable size, and it is the belief of some geologists that the straits between Cebu and Negros Islands are due to a down-faulted block of rock strata. Therefore, the construction of engineering works of any size on that island should be preceded by careful geologic investigations. As yet the writer knows of no engineering projects in the islands seriously affected by faults.

During a recent geological examination of the area in the vicinity of the Montalban reservoir, Dr. R. E. Dickerson suggested to the writer the possibility of a large fault traversing it. If further detailed study of the region should reveal such a break, it would be of the utmost importance to the citizens of Manila to know it. Possibly, this could not be worked out in less than several weeks, but whatever the length of time necessary, it would be justifiable.

All faults in the Philippines which the writer has seen are, with a few minor exceptions, of the normal type. Thrust faulting may be present.

Joints.—One of the commonest features of rock formations is jointing. The cleats in coal may be considered as jointing on a small scale. Any quarry man is of course familiar with the great, regular, smooth-walled cracks which traverse various formations for long distances and more or less in definite systems. These are both an advantage and a source of trouble. Farther on the writer calls attention to the part these play in the building of the Benguet road.

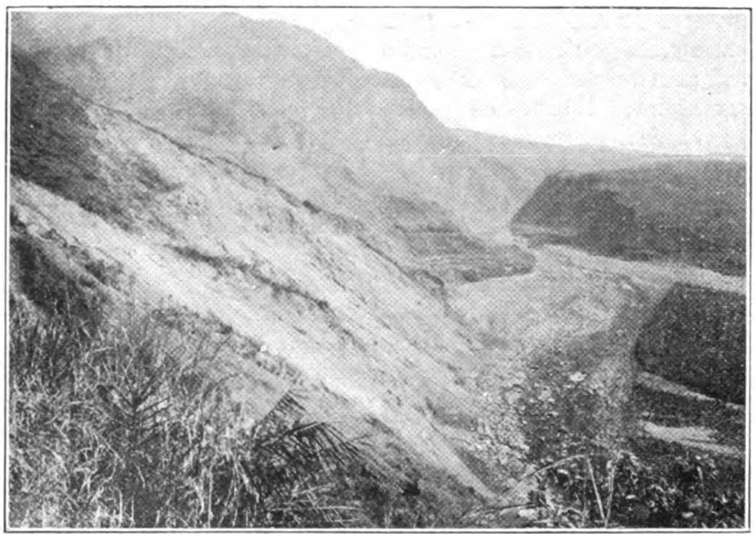
Folds.—The importance of folds in the strata, such as the syncline (basin) or monocline in the case of artesian water and the anticline (arch) in the accumulation of oil, is well known to most people nowadays; but has it occurred to many people that the ease of excavation, or the control of water, causing flooding, etc., are dependent upon the attitude of the formations? In the Philippines we have the rock strata in all conceivable attitudes, each locality presenting different conditions which must be studied locally. Of course, in this respect the Philippines and the tropics in general do not differ from many other parts of the world. How-

*Branner, J. C., Bull. Geol. Soc. Am. 21 (1910) 449-496.
†Oshima, M., Formosan Termites, Philip. Journ. Sci. 15 (1919) 319.
‡MacDonald, Donald F., Bull. U. S. Bur. Mines 86 (1915).

ever, owing to excessive vegetation and weathering these important structural facts are often concealed even from the trained eye of the geologist.

Special Problems

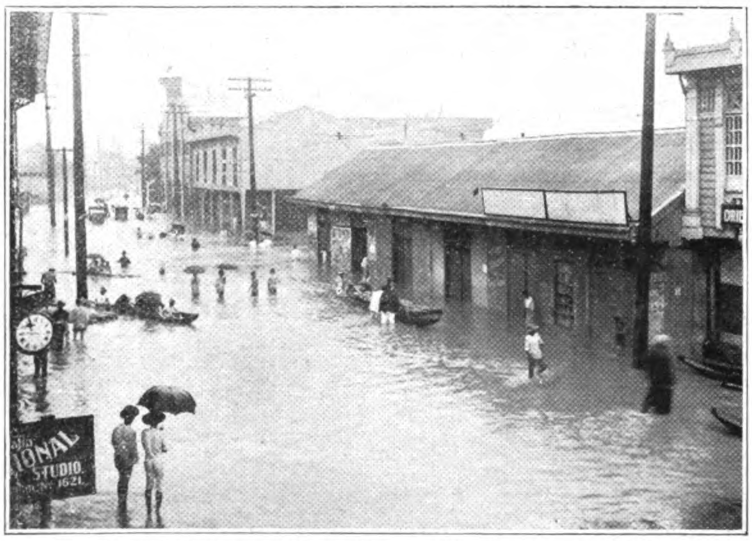
Road Building and Maintenance.—In parts of the tropics, and particularly in the monsoon region of southeast Asia, the seasons are sharply defined, one of practically no rain and one during which it rains in torrents. If we recall the rule that the carrying power of a stream varies as the sixth power of its velocity, we know at once we cannot take any chances with a tropical torrent. In regions of high relief we have four things to consider, and we cannot neglect any one of them. They are: Declivity or head, sudden increase of volume due to configuration of the valleys, the angle of slope of valley walls, and material and structure of the valley walls.



Chico River near Tinglayan, Kalinga Subprovince

The writer has seen instances where the highway was placed in a valley at such a point that the road was continually menaced by the stream just below it and by the sliding of material from the slopes above. The stream is dangerous because of two things: First, because of the sapping of the water itself; and second, because, when the velocity is doubled, it can carry particles of rock sixty-four times as large as before, and in time of freshets bowlders weighing tons are carried along, each one acting as a battering ram. No retaining wall can be expected to withstand this terrific bombardment, nor does it do so.

Again, the composition of the country rock, its structure, texture and the state of weathering are of vital importance; and, if this weathered material slides into the cañon below, a temporary and very dangerous dam results. When the dam breaks, as it soon must with the impounding of the torrent behind it, all is swept before it. We have a remarkable example of this in the now famous Benguet Road on Luzon Island. Bued River is a small stream, little more than a creek in the dry season; it flows from 1,524 metres (5,000 feet) elevation to the sea. The valley walls are V-shaped, the average slope being probably as high as 35° or even 40°. The country rock is a badly decomposed andesite, for the most part with some tuff deposits, much jointed and with innumerable small faults, all loosened by many earthquakes. Here we have ideal conditions of instability, which were perfectly apparent to geologists; yet, so far as the writer knows, no geologist was consulted by the engineers until it was too late. The inevitable happened. First, slides continued until the slopes reached the angle of repose; then dams followed, impounding the water to a great depth; next, the dams broke and search parties were out looking for the road, buried under twenty metres of débris. Now, after many years and the expenditure of much money, a new road has been constructed by way of the old Naguilian trail. We have had to go back to the ridges, following the example of the Spaniards. Of course, if we had cared to, we might have taken a lesson from the native trails, the majority of which follow ridges.



Flooded District, Callo Horran, Manila, Sept 2, 1914

In the matter of engineering technic involved in the construction of these roads, the writer would venture to lay emphasis on the necessity for drainage; keep the foundation of your road drained. The excellence and easy maintenance of the Hawaiian roads is due largely to the very porous subsoil and, consequently, perfect drainage. You may say that this is nothing new, that every engineer knows that; but the application of drainage in America, where the rainfall is merely a light summer shower as compared with the tropical downpour, is a different problem. As to how it should be drained, that is a matter not within the writer's province as a geologist.

Maintenance on a road constructed of poor materials is one thing, while that on a road wherein a wise selection of metal has been the rule is an entirely different thing. In this a geologist with his microscope is a necessity. Petrography, once looked upon as a mere academic study, is now indispensable to the scientific road builder. There is a pathology of rock just as there is a pathology of animal tissue. The microscope will reveal at once, and at little expense, whether or not the minerals composing the rock are sound, whether there is incipient decomposition, or a far-gone state of decay. It will show also the texture or fabric of the rock. If the rock has an ophitic texture, that is, the minerals interlaced to make up a sort of mat, then we may look for toughness. Why one rock splinters and another does not is at once made clear.

At one time the writer collected rock specimens from a number of places along one of the principal Philippine highways, and among the samples was one that yielded a briquet which when placed in the Page cementation machine did not break under two thousand blows, whereas an ordinary basalt briquet yielded at the twenty-second blow. A thin section of the fresh rock was made and examination showed that there was a small amount of secondary calcite in the rock, an alteration product of the lime-bearing silicates; it was this that furnished the excellent binding qualities. The rock was a diorite just beginning to decompose without having gone so far as to reveal this condition to the naked eye. This rock, with its holocrystalline texture and just the right amount of calcite, would make a most excellent road metal because it has two essential qualities, namely, toughness and high cementation quality. Of course, the objection of high cost will be raised at once; but no matter how the finances stand, there is never any excuse for putting worthless and unsuitable rock on a road. The proper

way is to let the geologist recommend one or more kinds of material, and then the engineer may consider which he can afford to use. Many state highway departments now follow this method, and formerly the engineers of the Philippine government always submitted their road and building materials to the bureau of science for the proper tests. Of late years this has not been done, and the results are beginning to appear.

Still another important factor to be considered in connection with the cementation quality of the road metal is that of the wind. During a typhoon, a storm which is much like the gulf hurricane, the velocity of the wind is as high as 165 kilometres (103 miles) an hour and the roads are swept literally by a natural cyclone blower and all loose material is removed as effectually as if a vacuum cleaner had gone over them. So we must consider not only the work of the deluge of rain but the combined effect of water and driving wind. Road maintenance from these and other causes is a very serious problem, in the Philippines at least, and any criticism of our highways should be tempered by a consideration of the difficulties we have to overcome.

Two chief sources of trouble in concrete mixtures in the Philippines are found; first, the fineness and generally poor quality of the sand, and second, lack of strength of the crushed rock. Both Reibling and King, of the bureau of science, have repeatedly called attention to these weaknesses in local concrete, as revealed by their long series of actual tests made on thousands of samples. The ultimate cause for this condition of things is found in the mineralogy and geology of the raw materials employed. Not only is the mineral composition of the sand commonly used here unsatisfactory, but also the extremely weathered condition of the materials is a matter of menace. Now it is agreed that the practical tests are of prime importance in the proving of such materials, but the examination of the sand and of thin sections of the rock is also of very great value. Such examination will reveal the cause for the failure; and, of course, this is really the most important thing of all, if we want to avoid future trouble of this kind.

The so-called "sand" oftenest used here is sand only by courtesy. The microscope reveals little or no quartz, the feldspar present is often in a far-gone condition of decay, and the predominant minerals are often dark-colored hornblendes, pyroxene, olivines, etc. To one accustomed to the clear, white, sharp Ottawa sand used in standard tests, the local sand appears more like dirt.

Reverting to the subject of landslides, a thorough acquaintance with tropical conditions will reveal at once the futility of attempting to control slides like those of the Culebra cut at Panama. Retaining walls, drainage, etc., are all makeshifts. The only practical and final solution of the problem is to increase the sliding until the walls are brought to the angle of repose where they will no longer slide. According to MacDonald, geologist of the canal commission, the most important types of slides were structural breaks and deformations and for this type of slide there was only one remedy that had utilitarian value under the conditions involved, and that was applied. It consisted in making the slopes less steep by removing material from their upper parts until the balanced pressure at the foot of the slope became less than the crushing or deforming strength of the rock. In other words, the slopes were brought down to the angle of repose.

This was recently well illustrated at Eugene, Oregon, where both the formation (weathered basalt) and the rainfall simulate tropical conditions. A hillside of this material, becoming saturated with rain water, started to slice off, slide, and flow under a large lumber mill at the bottom of the slope, bulging the latter upward, completely throwing it out of alignment and even threatening the structure. The simple expedient of sluicing at the foot of the slide solved the difficulty and the material of the hill was brought to such an angle that it no longer moved.

Artesian Water.—In view of the fact that a great many people have a hazy notion of what an artesian well is, the term is here defined. An artesian well is a type of well first bored, as far as we know, in Artois, France, and when the word artesian is correctly employed we mean a deep well from which water flows above the mouth under more or less pressure. This pressure is due to the peculiar geological conditions obtaining in the locality. Ordinary, shallow, dug wells are not artesian.

The principles governing the concentration and movement of ground water are now well understood; but, at the risk of repetition, the writer will make a few general statements.

Although we do not see it, the sea of undergound water is almost as extensive as, and in some ways more important than, the ocean. All the rocks, varying in degree of saturation, contain water down to limiting depth. Some of this water is found in the large trunk channels, joints, and faults, but a great deal of it is in the form of hygroscopic water; that is, water held in the pores of the rock by capillary attraction.

An English geologist, H. B. Woodward, makes the statement that the quantity of water held in the chalk of England by capillary attraction is tremendous. One square mile of dry upper chalk, one yard in thickness, contains ordinarily nearly 3,500,000 gallons of water, and when saturated holds 200,000,000 gallons. Recent experimental work by Van A. Mills * indicates that, in saturated strata, capillarity retards fluid movements, so that water so held might not flow readily.

Some rocks, like the dense volcanic flows and quartzites, contain practically no water. Other rocks, like the limestone formations, have subterranean rivers passing through them, but the sandstones and chalks are the most important in this respect. A true sandstone consists of grains of quartz compacted together. The more nearly spherical these grains are, the more continuous are the openings, ignoring for the moment the cementing material which in some cases may completely close the voids. In such an arrangement of spherical grains there is always one continuous passage through the mass. Along these passages the water travels. Some sandstones have as high as 35 per cent. of pore space.

The loose volcanic tuff formations of the Philippines are also great water-carrying formations. This water is generally circulating slowly in the small openings, but when the water reaches a fissure, naturally the circulation is rapid.

As the deep-seated igneous rocks are usually dense and have but little pore space, and as the fractures in these rocks have no regularity, it can be seen at once that they are poor formations in which to seek water. Water may be traveling along a fissure in such formations, and the well digger may perchance strike this fissure, but usually the chances are slim. There is no excuse for locating a well in such a formation, unless this is the only kind of rock in the region. A limestone formation is also poor, as a rule; for, while it is cavernous and contains underground streams, it is a piece of pure luck when one of these is struck. Pratt,† a former colleague in the Philippine geological work, found that where coral limestone was interbedded with clay layers a fairly good supply of water was available. Very often, however, shallow wells in limestone areas located near the sea would yield salt water or be dry in about half the cases. The best conditions are found in the sandstone, volcanic tuffs and beds of unconsolidated ash.

Having found the formation, we must next consider some features in the structure of the region. The ideal condition is where the sediments form a syncline (basin), with the water-bearing stratum outcropping at a higher point than the site of the well and where there is an impervious layer of clay or shale just above the water-bearing stratum. The effect of a fault on the water circulation would be to divert the flow to springs at the outcrop, but the effect of an igneous intrusion would be to block the water circulation. All of these conditions must be considered, if possible, previous to the digging of the well.

It is incredible that even at this late day water should be sought with a divining rod, yet a few years ago an attempt was made to find artesian water with a divining rod in the city of Zamboanga, Mindanao. Water was not found, and an examination of the geology of the country showed that very little chance existed

*Econ. Geol. 15 (1920) 420.

†Pratt, W.E., Philip. Journ. Sci. 10 § A (1915) 236.

of a supply being tapped within a reasonable depth in the location desired. In spite of some apparently successful instances of the use of the divining rod, the employment of this device may be classed with other pseudo-scientific operations, such as palmistry and astrology.

Probably the bureau of public works has paid more regard to the geology of the country than any other engineering organization in the Philippines; and, so far as its wells have been dug in the Manila central plain, good results have been obtained. But the writer wishes to emphasize this fact; that, in spite of all the practical experience of a well driller, there are many more things to be taken into consideration than simply those that pertain to digging the well.

Some years ago at Olongapo, Luzon, a well was drilled on the naval reservation; the writer, when visiting the place, examined the cuttings in the drill and found the material to be diorite, which is the basal formation of the island and contains very little water, having no regular continuous water-passages. The well digger drilled here for twenty-two months. No water was found, and in the end he lost all his tools in the hole. As the driller was paid by the foot, he, of course, did not have to pay the bill.

In parts of the Hawaiian Islands water has been found by sinking through the overlying formation, largely consisting of lava, to the ash beds that lie buried below. The water here is ponded in this loose formation by the coral reefs bordering many parts of the islands. The same conditions, no doubt, could be found in other tropical countries.

At the present time geologists are engaged in the Hawaiian Islands in attempting to locate high level sources of water to be brought down for irrigation purposes. Some success has been met with by bringing water through tunnels from the rainy sides of the various islands to the drier sides. It should be pointed out here that if the geologist is expected to predict the finding of water in such regions with any degree of certainty unfair advantage is being taken of him. The conditions in predominantly lava formations are too uncertain to permit of the more nearly exact work possible in the stratified rocks. The geologist can do many things, but he is not gifted with second sight.

Dams and Reservoirs.—The geological conditions affording the best sites for dams and reservoirs have also been discussed by several writers. With reference to this phase of the subject, the writer wishes to state that a geological examination of a district and several years of stream gauging are not only desirable but imperative in the tropics. Many examples of how these works should not be located could be cited, but two or three will suffice. The city reservoir at Montalban, Luzon, was located in a limestone gorge. The limestone is full of caverns and the reservoir failed to hold water until it was lined, bottom and sides, with cement. If the dam had been placed at the upper end of the gorge the reservoir would have had a natural clay bottom.

The destruction some years ago of the Tarlac (Luzon) dam probably could not have been foreseen, but if a few more data concerning annual precipitation and stream discharge had been secured the trouble might have been averted. Agno River when under full head is a terrible engine of destruction. Another dam was built in the hills back of Cebu, making use of an apparently substantial formation for abutments and spillway. Drilling was recommended by the geologist who examined it; but no, that would be too expensive. The abutments held in a terrific storm that ensued; but the spillway, which was too small, forced the water to eat its way down through a decomposed formation which had a hard shell on the outside, so that the dam was rendered useless. The writer, from his observations in the Philippines, should be inclined to say *never* when it can be avoided build a reservoir in the tropics. If water is needed, use diversion weirs in the streams or artesian wells.

Coal Mining.—The writer had not intended to touch on any phase of the application of geology to mining engineering in this article for the reason that the connection between the two is so generally recognized. There is one particular phenomenon that has given more or less trouble to those who would work coal seams in the Far Eastern tropics. It has been the writer's experience throughout some years of examination of coal prospects and mines in the tropics that the persistence of a given seam of coal is always a matter of conjecture. The seams are either interrupted by small faults or they thin, or " peter out," just when you are counting on a good working thickness.

We have great rainfall over most of Malaysia to-day. There is every reason to suppose that this has been the case throughout most of the Tertiary period, which is the age of the tropical Malaysian coal. These great deluging downpours of rain mean coarse sedimentation and frequent interruptions to the quiet accumulation of vegetal matter from which we are to hope for a future coal deposit. We do find that the character of the underlying and overlying beds in the neighborhood of these uncertain coal beds is very variable; coarse and fine strata alternate with, in many places, no great thickness to any one stratum. So the advice to the engineer or geologist who is sent out to examine a coal deposit in any part of the tropics is this: Examine carefully the nature of the inclosing strata, the character of the grains, their size and arrangement, and take nothing for granted; put down test pits or drill holes fairly closely spaced and, better still, drive on the coal. The reader who would care for more detailed discussion of this topic will find an admirable paper on the subject by Pratt.*

Geodesy.—Over fifty years ago there appeared in the transactions of the Royal Society† several articles by the Bishop of Calcutta, a mathematician and physicist of no mean repute, relating to the perplexities then confronting the surveyors in control of the great trigonometric survey of India. This, one of the greatest of surveys, has recently been completed. The problem that confronted them was how to account and allow for a very noticeable and very important discrepancy between the trigonometrically located stations and those ascertained by astronomical determinations.

It was expected that the great mass of the Himalayas would deflect the plumb bob toward them, but another factor entered into the problem which at first was not understood, namely, density. There was for some reason a deflection of less amount of the negative sign which could not be accounted for; it was finally accounted for by assuming a deficiency of gravity beneath the mountain mass and a greater gravity beneath the sunken area to the south. The whole question is intimately bound up with the theory of isostasy, which is too complex a subject for review in this paper.

In 1906 Hayford‡ wrote a paper, in which the whole question is reviewed and the theory of isostasy clearly substantiated.

In the course of the coast survey of the Philippine Islands, also, considerable discrepancies were frequently noted between the trigonometrical and the astronomical location of stations, in some places amounting to 30 or 40 seconds of arc; such a difference might mean a matter of one-fourth mile or more on the surface of the earth. How to adjust this has been a matter of some difficulty. The great piles of volcanic rock constituting the Zambales Mountains suffice to explain the discrepancies at some of the stations on the west coast of Luzon. Near Olongapo, it was found that the plumb bob was deflected to the west instead of to the east, though the main mass of the Zambales Mountains lies to the east. An examination made by the writer several years ago on the Cinco Picos Range, which lies to the west of Olongapo, revealed the fact that these mountains are made up of one of the densest rocks known, periodotite. This rock has a density of over 3, whereas the main mass of the rock in the Zambales Range to the east has a density of only about 2.5. Therefore, apparently, this discrepancy is explained by our knowledge of the geological features of the two regions.

The work of Hayford has shown so clearly the importance of the data of geodesy in the solution of problems of geophysics

* Pratt, W. E., Philip. Journ. Sci. § A 10 (1915) 289.

† Phil. Trans. Roy. Soc. London (1853).

‡ Hayford, John T., Proc. Washington Acad. Sci. 8 (May, 1906) 25 40.

that geologists interested in these broader and fundamental problems, such as that of isostasy, cannot afford to ignore them. On the other hand, from the example cited, the dependence is clearly seen to be mutual. The writer is planning to carry a small gravity instrument into the interior of Luzon on some of his expeditions within the coming year, as we have no data of this kind from the interior.

Physiographic Influence upon Economic Development.—Under tkis topic it is proposed to cite several examples of how a knowledge of the geologic and physiographic conditions would be of direct practical value in other matters, aside from its more obvious applications to mining, and so forth, already given. The relation to engineering here is only indirect.

Although Magellan discovered the Philippine archipelago by first landing at Cebu and although a large and prosperous city is there to-day, the physiographic advantages of the position of Manila are so superior that it has been able far to outstrip its southern rival, notwithstanding the fact that Manila as a Spanish city was not founded till nearly a half century later. Cebu is a distributing point and has to draw upon neighboring islands. In Manila we have a remarkable juxtaposition of sea, excellent harbor, river, mountain and plain (affording a productive hinterland) which has led to the development here of what is fast becoming the most important city of the Orient.

Seismology.—Earthquakes are not confined to the tropics. Nevertheless, many regions of great seismic disturbances are either within the tropics or not many degrees removed. There may or may not be any direct connection between these facts. It also happens that many of the geologically newer parts of the earth are within this zone. In view of the great engineering works built at Panama, in the Hawaiian Islands, in the Philippines, and elsewhere it is of prime importance to understand the principles controlling earthquake phenomena. The damage done at San Francisco by the slip along the San Andreas rift, the catastrophes of Messina and Avazzano, and the lesser disturbances that have occurred in the Philippines from time to time should force us to pull our heads out of the sand and look facts squarely in the face. Real estate boosters as a rule do not readily fall in with this idea.

For the benefit of the possible play reader a few elementary facts are here repeated. Earthquakes are due to three causes; namely, rockfall, vulcanism, and slips along fault planes. These are called tectonic. Those of the last group are most numerous and most destructive. The San Francisco earthquake of 1906 was of this class.

In an investigation conducted for many years by Father Saderra Maso, of the Philippine weather bureau, and the writer, we found that of the great number of earthquakes that occurred in the Philippines from 1599 to 1909 only a comparatively small number could be traced to volcanoes; that of the twenty-five seismic districts in the islands only five are near or include active or dormant volcanoes; and that two regions of greatest seismicity have no volcanoes at all.

Recently some very interesting and important conclusions concerning the connection between seismic phenomena and rainfall have been put forward by M. G. Zeil, * formerly topographer and geologist of the government of French Indo-China and now of the Carte Geologiqui of France. This investigator asserts that seismicity in various pa ts of the world increases with rainfall. He mentions only one notable exception, the Valley of the Amazon, where, although the rainfall is heavy, seismicity is feeble. He cites, especially, the example of Agusan Valley in the Philippines to which Saderra Maso and the writer called attention some years ago, though not connecting the fact with the rainfall of the region.

It appears that the rapid loading and unloading of a given piece of terrain by a heavy rainfall which is discharged quickly into the lowlands or the sea, effecting considerable erosion, is the prime factor in many of the sudden adjustments in the outer shell of the lithosphere. In a heavily forested region like the Amazon the run-off of the streams is slow and consequently erosion is comparatively slight.

The rainfall would have still another effect, that of lubricalion, thus causing slipping of one formation, or of the beds of the same formation, over one another.

M. Zeil in a letter to the writer has pointed out that in Annam, in those places where the natives have cut away the forests, the number and frequency of earthquakes have increased. Here is a splendid examplo of the need for co-operative investigations on the part of the engineer, the forester, the seismologist and the geologist.

This particular subject is one to which we have as yet devoted little attention in the Philippines, but we shall in the future attempt to follow up these most interesting suggestions of M. Zeil.

There are three things we must do in order to cope with earthquakes. The most obvious thing is in the line of engineering. We must build structures so tied together that the parts will not fly into fragments, and the material must be elastic. The safest and cheapest type of construction is the native house of bamboo wherein rattan takes the place of nails. Sand-lime brick securely tied to a steel frame, and re-inforced concrete, are the most suitable for large buildings. Volcanic tuff (locally quarried as Guadalupe stone) is one of the best cheap materials I have yet seen. The walls and many of the older public buildings of Manila are constructed of this stone.

Finally, as volcanic eruptions and tectonic earthquakes may both be connected with deep-seated phenomena in the earth magma, it behooves us to proceed vigorously and continuously with detailed volcanological studies along the lines laid down by Perrett, of the Vesuvius Observatory; Omori, of Japan; and Jagger, of the Volcano Observatory of Kilauea, Hawaii. If we do this we shall have a collection of data which in time will enable us to cope with these dreaded phenomena as we now do with the typhoon.

Summary

1. The geological agents at work in tropical regions are the same as those found operating in temperate parts of the earth, with the difference that they are often greatly accelerated in the former.

2. In the Philippines structural conditions are of prime importance in engineering. Both major and minor faulting occur here which as yet have not caused trouble save in mining operations.

3. Both road location and maintenance in tropical countries like the Philippines are much more difficult than in the United States and Europe.

4. Dams and reservoirs should be avoided when possible in countries like the Philippines.

5. The instability of the Philippine geological structure is established.

6. Weathering of the rocks in tropical regions is notable. The so-called laterite, in some places of considerable economic importance, is a product of weathering. It is characteristic of many tropical countries.

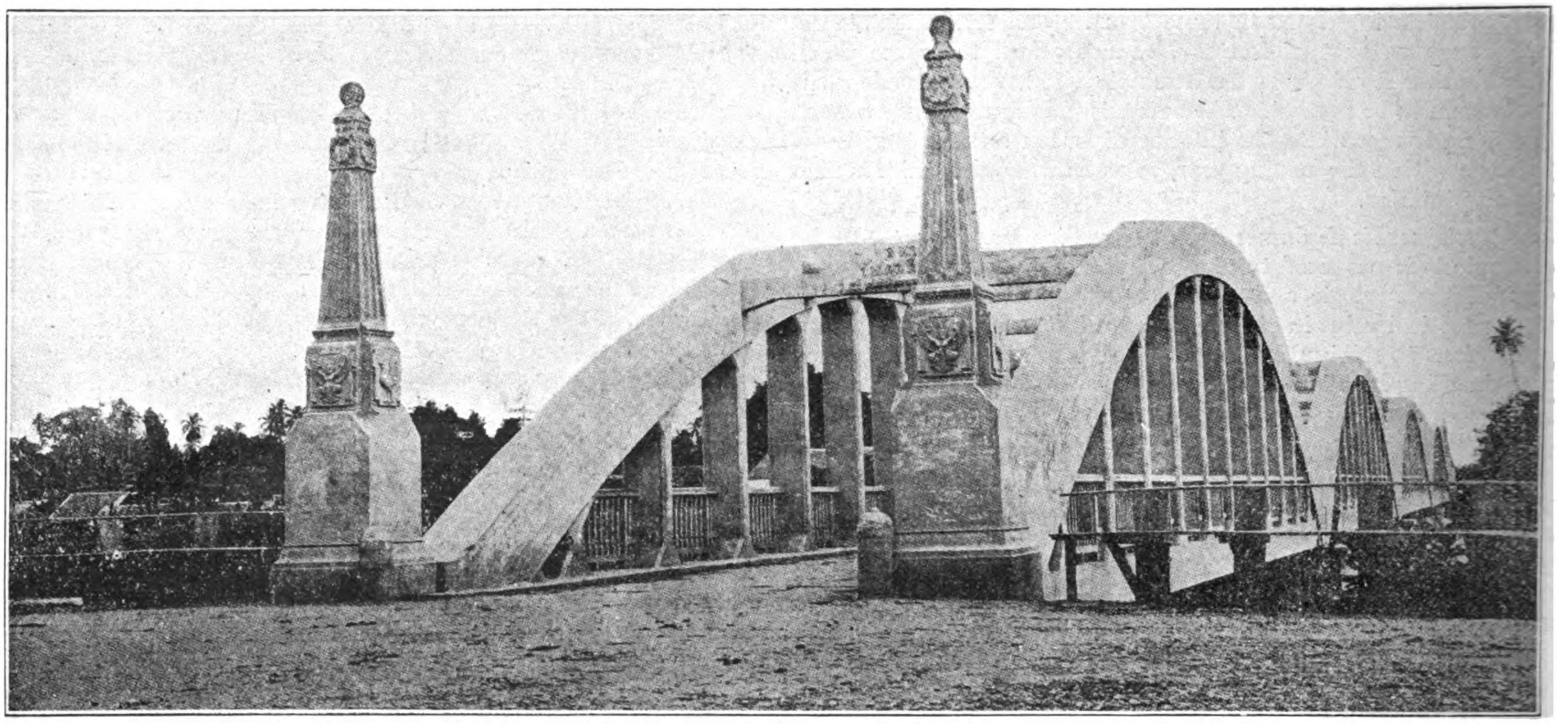
7. The geologic work of organisms is great in the tropics, though but little studied.

8. The work of tropical rain and running water is not appreciated as it should be.

9. Handbooks and formulæ prepared by engineers acquainted only with conditions in temperate regions are worse than useless in the tropics. They are positively dangerous.

10. Engineers as a whole should, if possible, give more attention to the study of modern geology which is no longer merely a descriptive subject but is becoming more and more a close relative of engineering.

* Zeil, M. G., Acad. des Sci., Seance de 12 juillet (1920) 117-119.



The Rasada Bridge at Lampang on the Northern State Highway, No. 10 of Siam. Built of Reinforced Concrete, 4 Spans of 32m. Total length 130m.

Siam's National Highways

JAPAN is famous for its Tokkaido ando ther medieval highways along which blazed the pomp of a feudal past, serving as the main artery of trade and travel in the days before the railway began its task of modernizing the country, Japan, it may be said, is just awakening to the need of better transportation facilities. Millions are now being freely appropriated for new roads. As we pass over into Korea we find that whatever backwardness is seen in Japan proper, is rully made up by the remarkably fine system of highways which reach into every corner of this dependency. A few years ago China had no roads outside the immediate environs of the large treaty ports. The famine of last year, however, gave a great impetus to new construction and from all sections of the vast country we now hear of new roads, autobus scheme and other signs betokening a healthy interest in transportation problems.

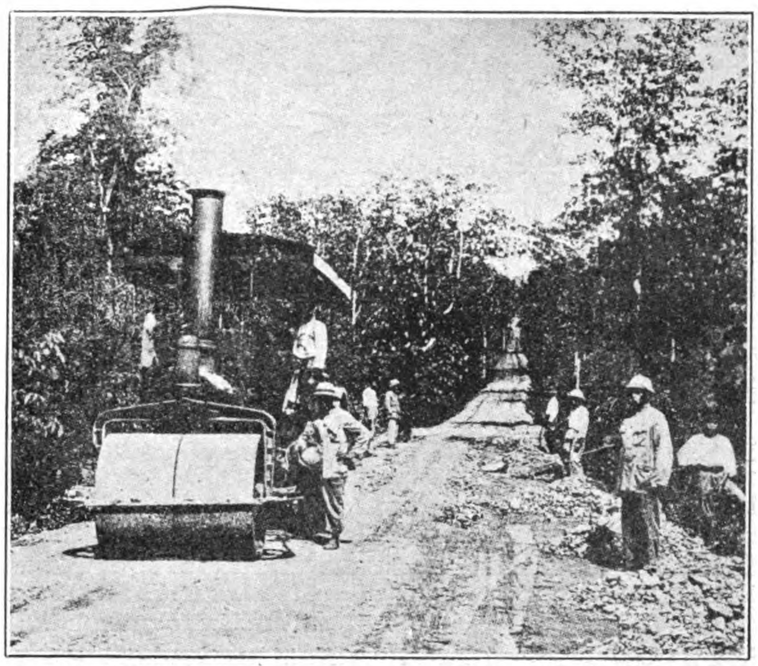
It is only as we go further south in Eastern Asia that we find road-making forming part of a fixed government policy with definite programs and budgets. Americans in the Philippines set the pace and covered the islands with a system of highways, the admiration of tourists and visitors from all parts of the world. Several years, however, of Filipino autonomy under which the roads have been permitted to deteriorate, has provided the opportunity for other sections of south-eastern Asia to forge ahead and surpass the Philippines in the quality of their highways. Especially is this so in Hongkong and Kowloon, where the roads, although of limited mileage, are unrivalled by any other part of eastern Asia. The highways of the Federated Malay States are now considered as the best, with Java as a close second.

The kingdom of Siam is coming to the front with a national road building program. In 1918 a royal decree authorized the abolition of the old road commission and handed over its work to the ministry of communications. A department of ways was created under the direction of Phya Sarasastra Sirilakshana, who, as chief highway engineer, organized a staff and force of 1,735 the first year, in which only four Europeans were employed. The last year, 1920, saw this force increased to 2,136, composed of Siamese, 1,802 ; Europeans, 4 ; Chinese, 199 ; Indians and Malays, 130. The Chinese are employed mostly in earthwork and erection of bridges.

The new department commenced its work by devising a national system of highways to be controlled by the central government, and for this purpose took over such provincial and other roads deemed most important as trade routes. In this manner a nucleus of a good national system was found, whose future improvement, maintenance and extension would come under the direct charge of the government. For the selection of other state highways investigations are being carried out, and it is hoped that with a fuller knowledge of trade and traffic requirements, checked by actual traffic statistics, the new administration, in course of time, will be able to determine the best and most important routes to be incorporated into the state system, and also to select the most suitable centres of communication from which to radiate networks of subsidiary roads. It is expected that constant reclassification of roads must be made during the first few years, and that a settled program cannot be arrived at until full and exhaustive studies of various conditions and possibilities have been carried out. In other words, Siam is going ahead with her road building along lines that is hoped will make for economy and efficiency. In order to secure uniformity of work, an instruction manual was issued for the use of the staff.

For the purpose of administration, the new department has been subdivided into three divisions : (1) Northern Highway Division, with headquarters at Nakon Lampang ; (2) Central Division, with headquarters at Bangkok ; (3) the Southern Division, centred at Singora. These divisions are again divided into sub-divisions, and districts according to the number and importance of the highways under their charge. The main object of the new department in creating the new highway system is ultimately to reduce the cost of transport per ton kilometre, thus encouraging the commerce of the country which cannot be handled by railway or river.

To arrive at a proper appreciation of the transportation needs of the country a most comprehensive record is being compiled of the traffic over the various roads in the country. Observations are being constantly made and a traffic census compiled, with special



Road Making in Siam. The Denwaya-Prae Road, of the Northern State Highway Division

reference to the staples of the country requiring transportation for export.

The total length of the Siam State Highways for 1920 is given in the following table :

Division	Under Maintenance I	II	III	C.T.	B.P.	Under Improvement I	II	III	C.T.	B.P.	Under Construction I	II	III	C.T.	B.P.	Total per Class I	II	III	C.T.	B.P.	Total Kms.
Northern	—	4	—	—	—	—	53	49	34	—	—	—	240	—	—	—	57	289	34	—	380
Central	—	—	—	—	—	—	—	—	1936	—	—	—	49	112	—	—	—	49	2048	—	2097
Southern	—	—	—	—	—	83	43	230	400	—	—	—	170	164	—	83	43	400	564	—	1090
Total B.E. 2462	—	4	—	—	—	83	96	279	2370	—	—	—	459	276	—	83	100	738	2646	—	3567
Total B.E. 2461	—	—	—	—	—	84	89	669	1972	—	—	—	674	112	—	84	89	1343	2084	—	3600

Note :— I. = First Class Road C. T. = Cart Track
II. = Second Class Road B. P. = Bridle Path
III. = Third Class Road

For the first year of its operation, the department expended Ticals 832,784. This was increased to Ticals 1,213,972 for the year ending March 31, 1920. Of this sum, Ticals 359,223 was devoted to construction, Ticals 577,133 to improvements, while Ticals 200,279 went to maintenance. The total amount expended by the new administration for the two years ending March 1920 amounted to Ticals 2,045,856. Considerable plant and equipment and various road-making machines have been purchased from abroad, the expenditures for these items for the year ending March 1920, being Ticals 65,793 in comparison with Ticals 13,923 the previous year. In fact, the work of the new department has been considerably handicapped the first two years by the lack of this equipment, and is now endeavoring to enlarge its capacity for further and better work by the purchase of new plant and road machinery.

The highway authorities in Siam are having the same difficulty with the upkeep of the new roads as the Americans originally had in the Philippines, where the old native carts with their narrow knife-like types cut the road to such an extent that a law had to be passed regulating the width of the tyre. The same troubles are being encountered in Siam, where, after a nice new stretch of highway is completed in certain districts, it has been quickly damaged by the heavy timber transportation on these narrow tyred vehicles. Local authorities have received instructions from the government to forbid such traffic and regulations are to be placed in force limiting the size of tyres.

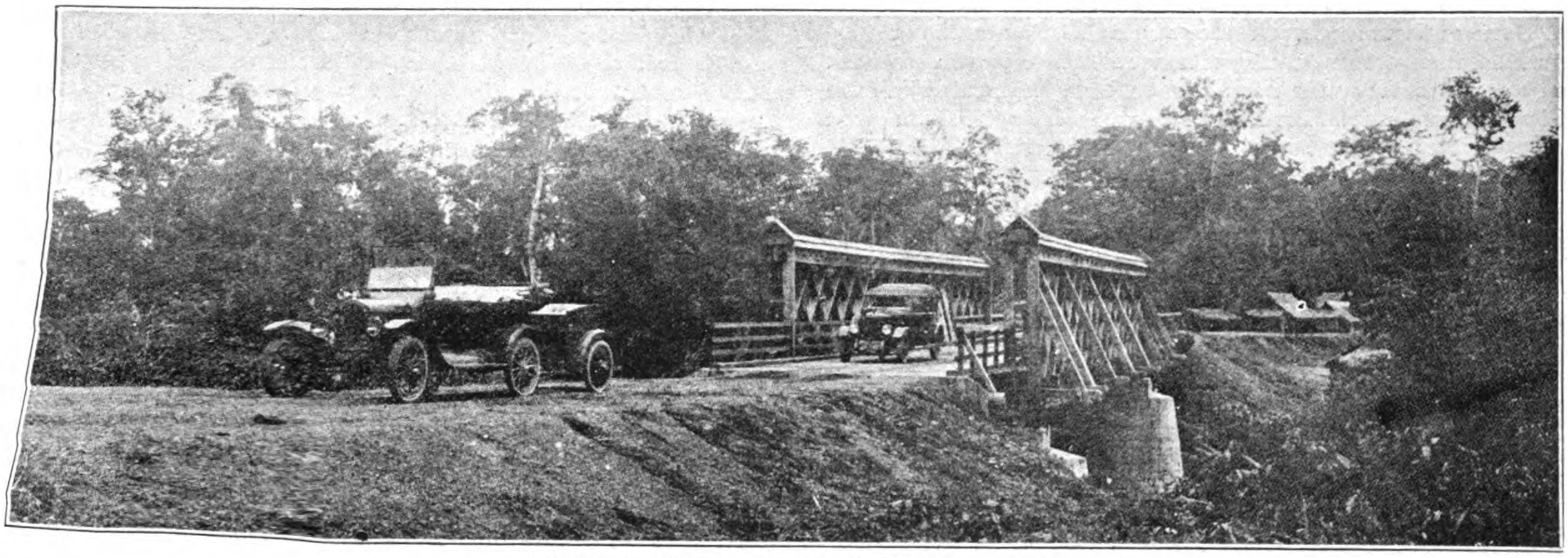
List of Highways

Northern Division

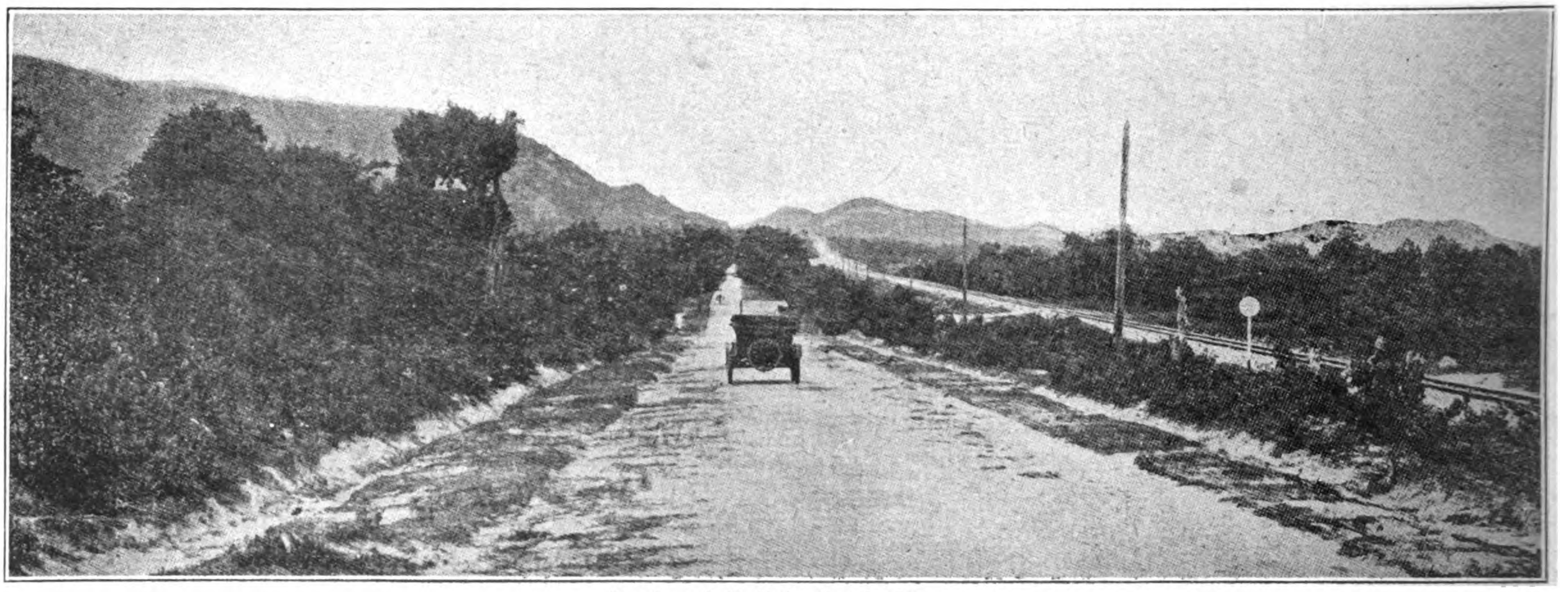
No.	Between	Length of Highway under Maint.	Improve.	Const.	Total length	Class
1	Den Jaya—Phrae	—	25	—	25	II
2	Lampun—Chiengmai	—	28	—	28	II
3	Lampang—Chiengrai	—	—	240	240	III
4	Chiengmai—Mae Rim	—	15	—	15	C.T.
5	Chiengmai—Sankambaeng ...	—	13	—	13	III
6	Chiengmai—Doi Saket	—	19	—	19	C.T.
7	Chiengmai—Mae Tachang ...	—	14	—	14	III
9	Station—Lampang	4	—	—	4	II
10	Utaradit—Phra Taen—Laplae	—	22	—	22	III
	Total ...	4	136	240	380	

Central Division

No.	Between	Length of Highway under Maint.	Improve.	Const.	Total length	Class
1	Bang Mong Nak—Petchabun ...	—	—	112	112	C.T.
2	Pak Preo—Hnong Kae... ...	—	22	—	22	C.T.
3	Chandhaburi—Tha Cahlaeb ...	—	—	14	14	III
4	Trad—Landing	—	—	—	—	—
5	Korat—Prachin...	—	371	—	371	C.T.
6	Korat—Skol Nakorn	—	405	—	405	C T.
7	Ban Tum—Ubol	—	353	—	353	C.T.
8	Ubol—Roi Etch...	—	172	—	172	C.T.
9	Udara—Skol Nakorn	—	162	—	162	C.T.
10	Korat—Hnong Kai	—	391	—	391	C.T.
11	Pimul—Chong Mek Pass ...	—	—	35	35	III
12	Nang Rong—Buriram	—	60	—	60	C.T.
	Total ...	—	1,936	161	2,097	



Mae Moh Thasi Bridge K. M. 35. Northern State Highway No. 3

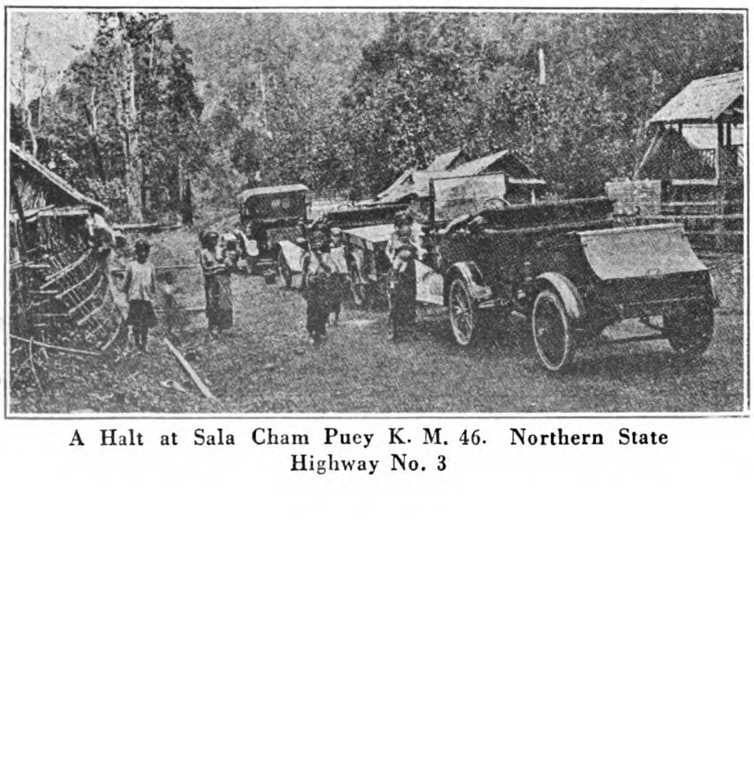


Road and Rail in South Siam

SOUTHERN DIVISION

No.	Between	Length of Highway under Maint.	Improve.	Const.	Total length	Class
1	Chumphon—Tap Lee	—	—	51	51	III
2	Thanun—Tai Muang	—	24	—	24	III
3	Kok Kloi—Kalai	—	17	—	17	III
4	Setul—Hnong Chin	—	40	46	86	III
5	Tongkha—Laem Kuan... ...	—	35	—	35	II
6	Tongkha—Sala Ketho	—	15	—	15	III
7	Tongkha—Ban Ra-Ngaeng ...	—	22	—	22	III
8	Ban Tha Rua—Ban Bang Tao...	—	8	—	8	II
9	Kan Tang—Patalung	—	96	—	96	III
10	Trang—Nakorn (Ta Bae) ...	—	136	—	136	C.T.
11	Songkhla—Sadao	—	83	—	83	I
12	Ban Ko Hongse—Haad Yai ...	—	—	5	5	III
13	Raman—Kabu	—	10	—	10	C.T.
14	Patani—Yala	—	46	—	46	C.T.
15	Patani—Raman...	—	75	—	75	C.T.
16	Patani—Tanjong Mas	—	122	—	122	C.T.
17	Yala—Yaha	—	11	—	11	C.T.
18	Ban Pong—Kanchanaburi ...	—	—	56	56	III
20	Sadao—Padang Besar	—	—	12	12	III
21	Yala—Betong	—	—	118	118	C.T.
22	Nakorn—Ronglek (Nobpitam)...	—	—	46	46	C.T.
	Roads in Renong	—	16	—	16	III
	Total ...	—	756	334	1,090	

Some of these roads will have a great bearing on the opening up of Siam, the transportation of her products to outside markets, and closer intimacy with her two neighbors, Indo-China and the Malay States. In the Northern Division, Highway No. 3, between Lampang and Chiengrai, 240 kilometres in length, when completed, will be one of the most important trade routes in the north. It passes through Muang Ngao, an important teak trade centre, and other well populated and fertile districts, and will open up the rich plains of Chiengrai, and bring the town of Chiengrai within one day's motor car journey from Lampang.



A Halt at Sala Cham Pucy K. M. 46. Northern State Highway No. 3

The greater portion of the roads in Central Highway Division runs through the eastern and north-eastern parts of the kingdom. Owing to the peculiar sandy soil and the severe floods arising from the Mekong and its tributaries, coupled with the fact that the traffic is largely composed of bullock carts with sharp wheels, render the problem of designing a suitable system of highways in these regions peculiarly difficult, and most careful studies are being made before any great expenditure is authorized. The most important undertaking in this division is Highway No. 6 from Korat to Sakol Nokorn, a distance of 405 kilometres. This highway leaves Korat by Pratu Phi and along the old Pimai road via Tha Chang to Buddhaya Song, Roi Ed and Sakol Nakorn. The importance of this road is seen in the 1919 traffic census. No less than 121,480 carts passed a given point during 1919, carrying roughly 26,000 tons of merchandise. Besides being the main highway between Nagara Rajasima and Prachin, this road is also an important link connecting the Korat plateau and the country round the inland sea of Cambodia, the most important trade route between the eastern plain of Siam and western Cambodia. In the dry season the amount of traffic passing through Chong Tako Pass averages 100 over carts per day. These carts go down into Cambodia loaded with general merchandise and come back to Siam loaded with salt and dried fish, the product of Talesap, the inland sea of Cambodia. Although the importance of this old trade route will be considerably diminished when the eastern line of the state railways is completed, enough traffic will remain to influence the department of ways to keep it in a state of good repair.

The roads in the Southern Highway Division are quite as important as those in the north opening not only rich mineral districts but linking up on the south with the highways of the Federated Malay States. The visitor to Siam coming from the direction of the Red Sea can now leave the steamer at Penang and take the F.M.S. railway through Alor Star to Ootapao junction and thence by the southern Siamese line to Bangkok, and then on by motor or rail to the Cambodian frontier, through the district to Saigon. In due time the Indo-China railways will be connected, permitting through communication with Haiphong and the Chinese border. The principal highway connecting Siam and the Federated Malay States is between Singora and Sadao, a first-class road, 84 kilometres in length. It has, however, lost much of its importance since the opening of the railway through Padang Besar to Panang and Singapore. Many of the roads in the southern division are being constructed for the purpose of opening up new mining districts.

New Radial Type Loader for the Rapid and Economical Loading of Loose Materials

IN recent years the increasing use of sand, gravel, crushed stone, ashes, slag, etc., for road building, concrete work, and other purposes as well as the increased storage of coal and coke has caused the handling and rehandling of immense quantities of loose materials.

During the time that help was plentiful and cheap the prevailing method was to use a gang of laborers to shovel material from ground storage to wagons or trucks. However, the constantly increasing cost and acute shortage of labor demanded the substitution of mechanical handling machinery to replace the expensive and laborious "hand shovel" method as depicted by figure .11495.

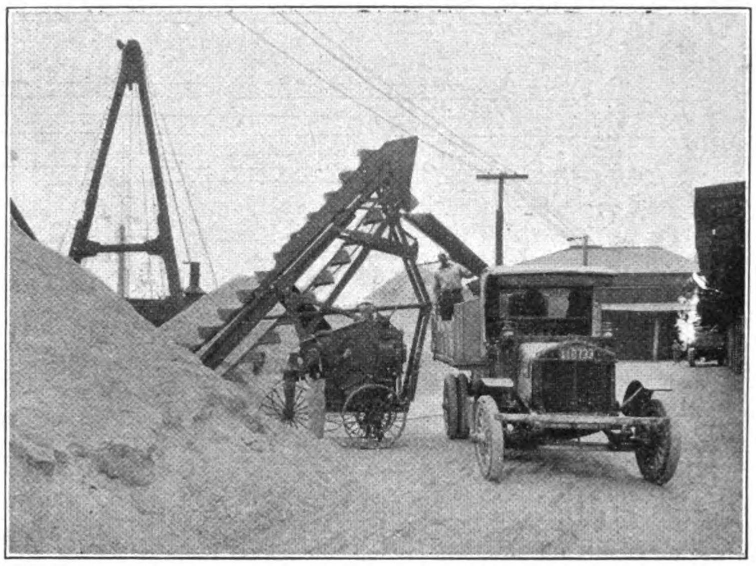
The greatest objection to the old four-wheel type of loader was its inability to feed into the pile. The radial type loader digs itself into a pile of material—each bucket being completely filled.

Three-Wheel Construction

The three-wheel construction of thd Jeffrey radial loader enables it to move backward and forward along straight lines into pile of material.

By turning the stearing wheel at quite an acute angle to the driving wheels the discharge chute will remain practically stationary

The Old Way



The New Way

as to the centre of the circle while the pick up end of the extended elevator boom will travel in a circular path. If the stearing wheel is gradually turned through a few degrees either way from the above circular path the whole machine while cutting from right to left in an arc will gradually move forward into the pile allowing full range of the machine.

To meet this demand the Jeffrey self-propelling loader manufactured by the Jeffrey Manufacturing Company of Columbus, Ohio, was brought out about 10 years ago after extensive experiments and tests and careful study of the then existing conditions, being the first machine of its kind to be placed on the market, and has proved a remarkable labor saver and quick handler of materials.

It has been used with great success by hundreds of leading concerns but in order to meet developments in the various industries and the constantly changing conditions the Jeffrey Company have developed an improved design known as the radial loader which overcomes all the objections of the old type of machine and is the last word in design and constructions.

This new type of loader is made in two sizes to suit capacity requirements and service conditions. The type "K" has a capacity of 1 cubic yard per minute while the type "G" has capacity of 1½ to 2 cubic yards per minute.

Self-Feeding into Pile

The buckets of the elevator are wider than the elastic boom. This feature combined and that of the three wheel chassis allows the machine to advance into the material under its own power 8 to 10-ft., without any cleaning up whatever.

There is a great advantage in having the loader feed itself into the pile over other methods of hand shovelling or of using the special mechanical device to pull the material in front of the buckets.

Other Advantages of the Radial Loader

The radial loaders are built in two sizes known as type "K" and type "G." The buckets used on both type are designed for heavy service. The type "G" has 18″ × 12″ and type "K" 14″ × 10″ heavy malleable iron buckets with renewable digger edge, steel teeth, riveted on front lips and ends to protect them from wear.

Two Speed Features

Experiments have shown that a two speed machine is absolutely essential to obtain the greatest results with the least labor. The Type "K" radial loader has a fast speed of 60 feet per minute for traveling from pile to pile and a slow speed of 4 feet per minute for feeding into the material. The Type "G" loader has a fast speed of 40 feet per minute for traveling from pile to pile and a slow speed of 2 feet per minute for feeding into the material.

The Dairen Waterworks

The Present and Future of a Model Establishment

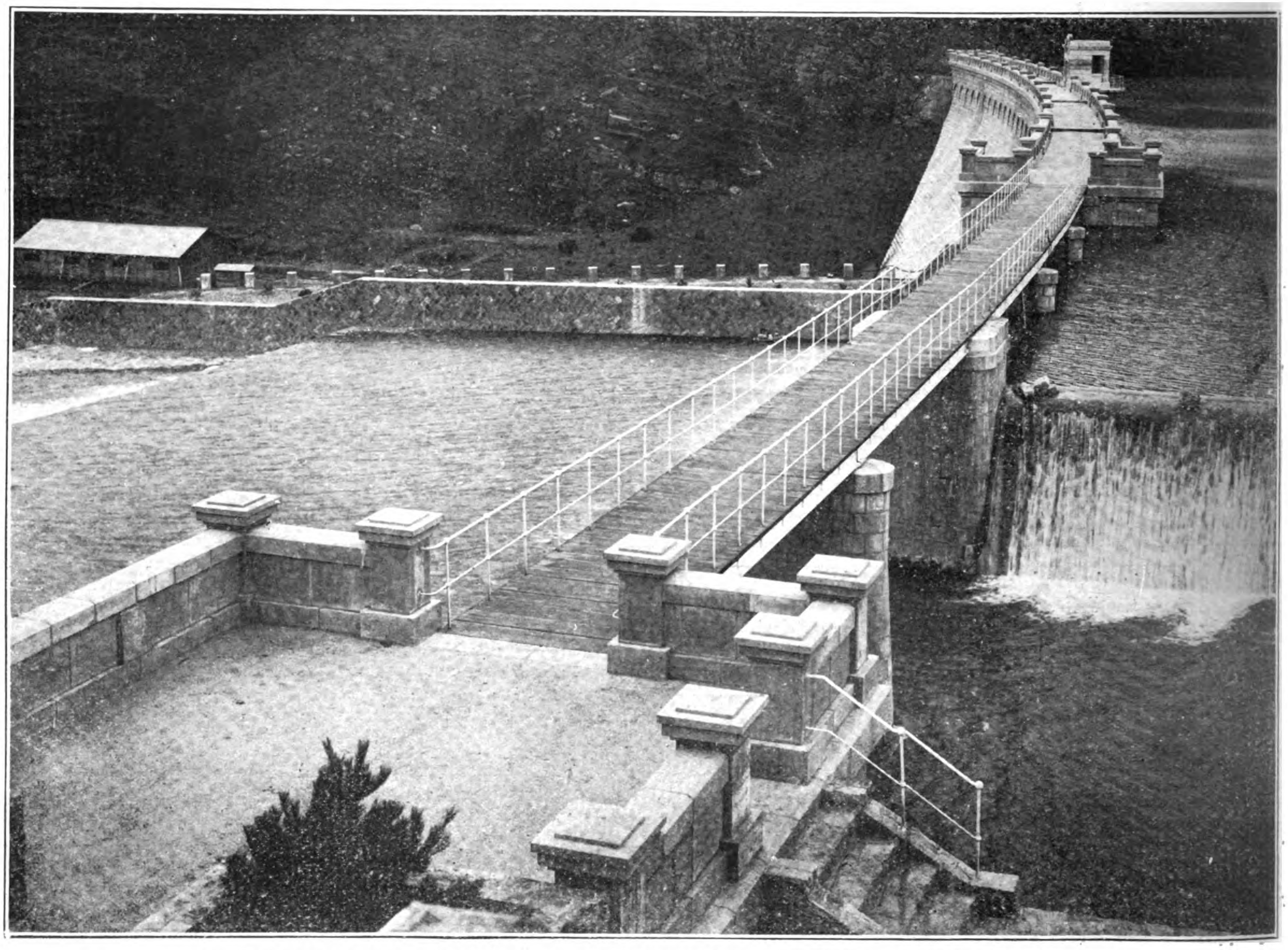
By Dr. Y. Kuratsuka

I. Introduction

THE most important feature of a waterworks is the installation at the water source. The water source varies according to the geological, geographical and also meteorological conditions. But it may be classified into (1) drawing upon a river or a lake, (2) dependence upon a spring or natural fountain, (3) damming of rain water in a reservoir constructed for the purpose, and (4) drawing of a subterranean water at a great depth by means of wells, hundreds or sometimes thousands of feet deep. These may, however, be most essential things to be done are to make a comparative, comprehensive study of rainfall, temperature, evaporation, velocity of wind, etc., together with the topographical and geological conditions of the particular locality, for which the waterworks is intended, and to draw a scientific and rational conclusion from the premises at command.

We will now take up Dairen.

The annual rainfall at Dairen amounts to only about 600 millimetres, being not more than two-fifths of the mean annual rainfall for Tokyo, which is 1,500 millimetres. The Dairen figure even ranks below that for Hokkaido, the driest district in Japan.

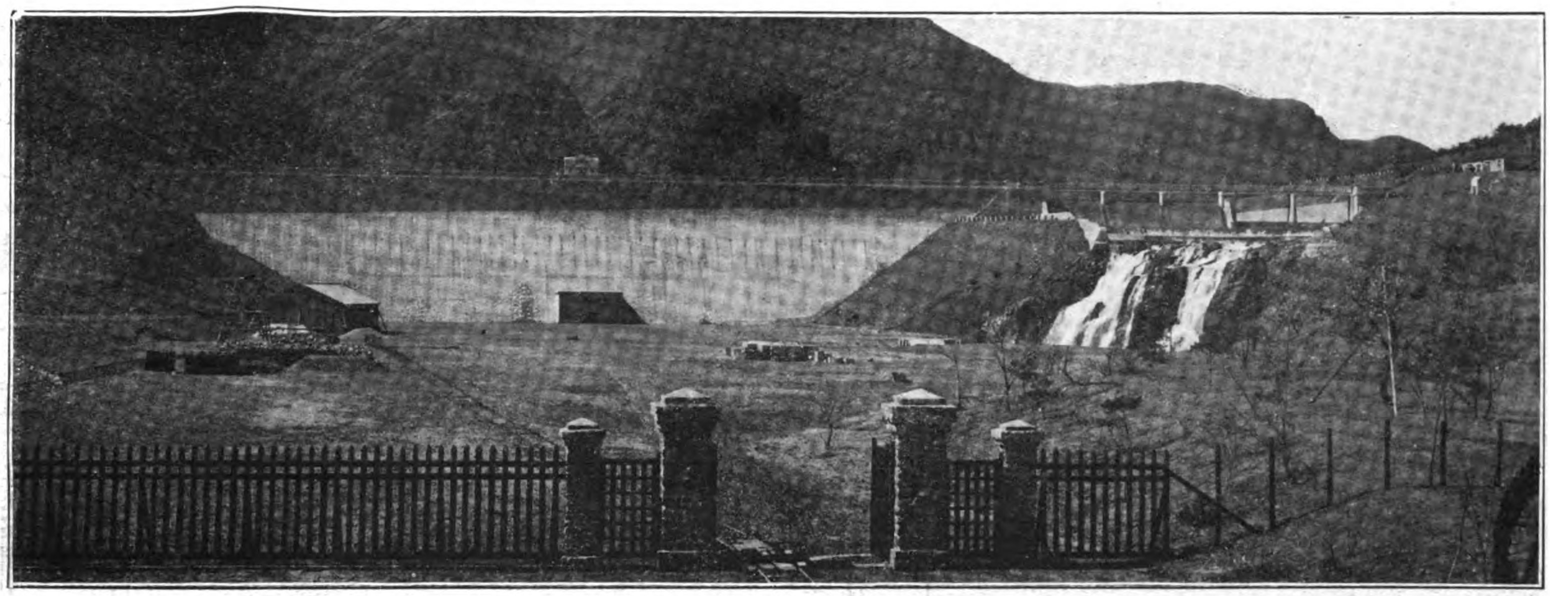


Looking down upon the Embankment of the Dairen Waterworks Reservoir at Wangchartien

disposed under the two general heads of a surface water source and a subterranean water source.

Still, in whatever case, for the water at a water source, rain water must be depended upon. Rain is, indeed, given man to serve as the primary source of water supply, for one. For this reason, the amount of rainfall is a most important factor to be considered in designing a waterworks of a city. For the authorities entrusted with the design and construction of a waterworks, the

The annual average rainfall is 638.13 millimetres. The heaviest rainfalls are experienced during the three months of July, August and September, followed by May and June. In any of the other months, the rainfall is usually very light. In other words, the rainy season runs from about the middle of June to the latter part of August, and the dry season from November to the ensuing March. In particular, February has the lightest snowfall and during this month the dry cold characteristic of Manchuria reigns.



General View of the Dairen Waterworks at Wangchartien, showing the Preservation of Natural Beauty in the Shape of a Waterfall

Thus, the total annual rainfall amounting to only about 600 millimetres, the rivers and brooks have only a nominal amount of water running throughout the year, except in times of freshets which occur at irregular, but distant intervals. It may be added that the flood is only short-lived in most cases.

Although the rainfall is small, the factors for causing loss to the water available are many and active. Over and above, Dairen is located at the extremity of a small peninsula, and although there are undulating hills, the region is wanting in broad glens and large rivers. Besides, the rocky structure predominates in its geological formation, and wooded area is preciously small. This feature deprives the locality of the capacity to store the rainwater. At a heavy rain, the rivers will be readily swollen all at once, but will relapse into the shrunk-up condition in a few days' time.

Geologically speaking, the Kwantung Leased Territory belongs to the Palaeozoic group chiefly composed of gneiss and rocks of pre-Cambrian system, which latter consists principally of layers of various kinds of quartzite, quartzite-slate and clay-slate, etc., overlapping one another, being characterized with the predominance of hard and dense quartzite. Granite rocks traced to the pre-Cambrian Period are found scattered about. There is the least probability of the existence of any water-bearing strata as the source of water for artesian wells. Altogether, the district is a hopeless country for striking a subterranean water vein.

From December, 1912, to July, 1913, a boring was executed at Hsiaokangtzu (Chinese quarter of Dairen) with Calix rotary core drills, to test whether water can be obtained or not by deep well. It was drilled to the depth of 585-ft. The pains taken was rewarded only by the penetration of the layers of diolite, quartzite, limestone, slate, etc., but nothing like a water bearing stratum. This attests to the hopelessness of obtaining an underground water vein about Dairen.

From the above, the only inference deducible is that, for the extension of the waterworks, which forms a problem of life and death to the growth of the city of Dairen, the surface water, meagre as it may be, must be relied upon. And, unlike other cities in Japan and elsewhere, where natural sources such as rivers, lakes, etc., are available, what may be styled the reservoir system is the only practicable way open. Even in the event of the adoption of the reservoir system, the supply capacity will prove comparatively low for the extensive scale on which the reservoir has been built, in view of the moderate rainfall and the active operation of the loss-factors such as evaporation, etc. Moreover, the topographical conditions of the district are such that no catchment basin of a large area can be found. Thus, the capacity of a reservoir must have a limit placed thereon. In consequence, in planning the extension of the existing waterworks in order to meet the rising need of the city of Dairen, it must be admitted to be absolutely impossible to make an ample provision for the generations to come. Such is one of the limitations, from which we can never escape.

In other words, in case of the city of Dairen continuing to expand at the pace kept thereby hitherto, constant effort will have to be used to maintain the waterworks, for one, in an adequate condition.

This point was appreciated by the Kwantung government, and an appropriation amounting to Y.1,819,000 was set aside in order to extend the waterworks and to complete the water source of the Ma'an river as an enterprise extending from 1914 to 1919. This is what is referred to as the second extension program. Still, there can be no depending on the available supply, granting that the population of the city of Dairen keeps growing. Therefore, as a continuation work from 1920 to 1924, the construction of a new reservoir at Lungwangtang is now in progress, at the total estimated cost of Y.4,680,000. This may be called the third extension program. That further extensions will have to be executed in the future will be readily understood. Up to the second extension program (as matters stand at present), the construction work presented no engineering difficulty to speak of, and the requisite cost was also not excessive. But the site of the third extension program (Lungwangtang) is situated more than fifteen miles west of Dairen. The intervening country is interspersed with chains of hills running in all directions. This renders the execution of construction work especially of the laying of leading main pipe line or conduit very difficult. Again, when at some future time, the fourth extension program has to be tackled with, the water source will have to be sought no nearer than Chinchou district, and a tremendous sum of funds will have to be laid out.

II. History of Dairen Waterworks

The Dairen Waterworks was originally designed by the Russians as one of the varied installations requisite to the port and town of Dalny (now Dairen) and the railway, when they leased Liaotung peninsula from the Chinese government and planned to construct a commercial port at Dairen in 1901.

The Russian plan had not yet been completely executed when the Dairen Waterworks passed into the Japanese hands.

What was designed by the Russians was only an improvised affair on a very small scale.

It consisted of the following :—

Eight wells lined with stone, each 20-ft. in diameter and about 20-ft. deep, were sunk in the Malan river at South Shahokou at nearly four miles west of the city of Dairen in order to gather the underground flow in the gravel layer. The water so gathered was pumped and transmitted through 6 inch piping by two Washington

pumps, each of about 18 horsepower, to the service reservoir on Fushimidai heights, at the altitude of about 190-ft. above the sea level, to-be distributed to the railway administration quarter (now called Roshia-machi) and the locality about the railway station.

Further, two wells were sunk in Higashi-Koyencho (at the east of the South Manchuria Railway Company's general offices). This is known as "Waterworks No. 2" which has subsequently been transferred to the management of the railway company. The water of this waterworks is supplied to the Dairen harbor and also the railway station.

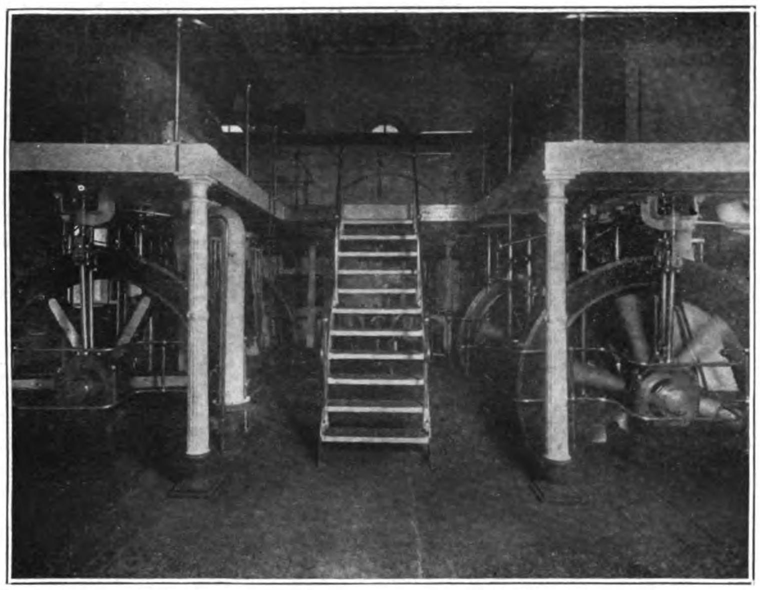
The maximum capacity of the above waterworks was only 1,000 tons at Shahokou and about 100 tons at "Waterworks No. 2."

and branch pipes. (Reference is invited to Chapter III). The items of the greatest urgency were taken up before the rest, and even prior to the completion of the construction work, the public began to be supplied through the newly laid forcing and distributing pipes in February, 1908.

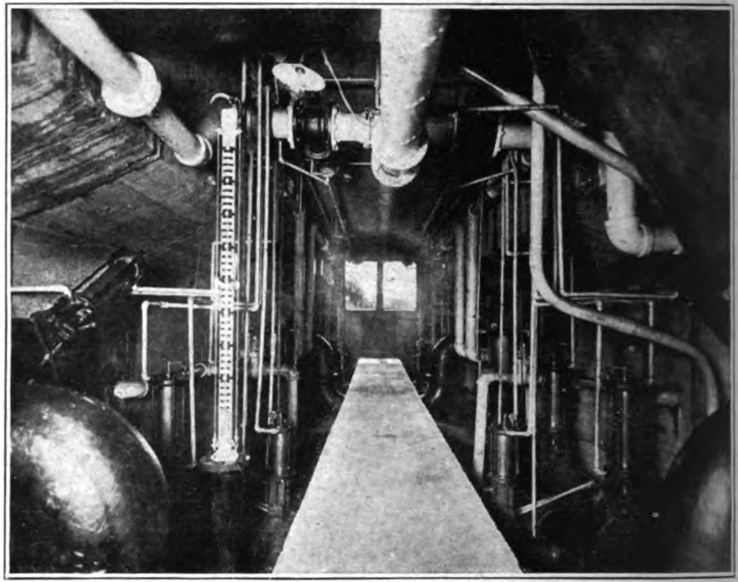
As the city of Dairen grew, the supply from the street hydrants not to speak of the private taps, increased steadily in the number of the clients and also in the quantity of consumption.

In July, 1911, a restriction had to be placed on the hours of daily water supply from the 3rd to the 13th. By July, 1912, the daily maximum consumption reached 6,100 tons, which was close to the limit of the supply capacity of the waterworks then existing. On the other hand, the rate of increase of the population of Dairen

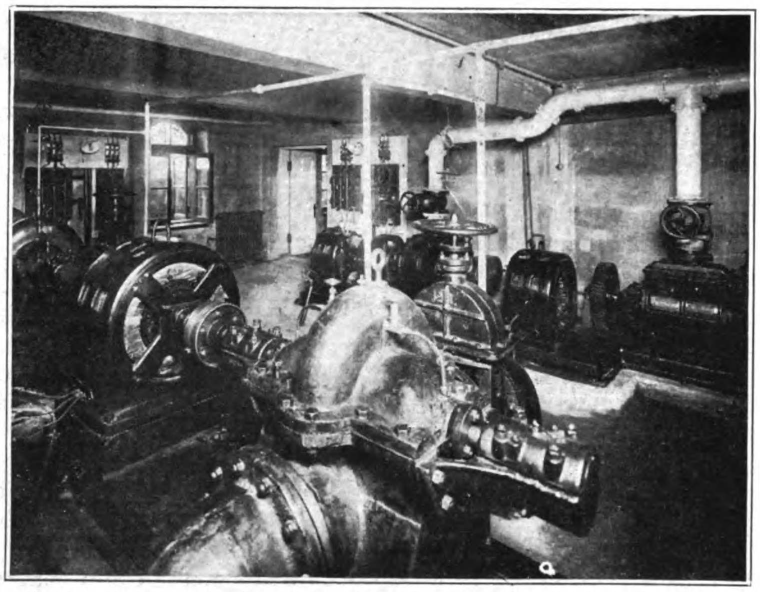
SOME OF THE MACHINERY AT THE DAIREN WATERWORKS



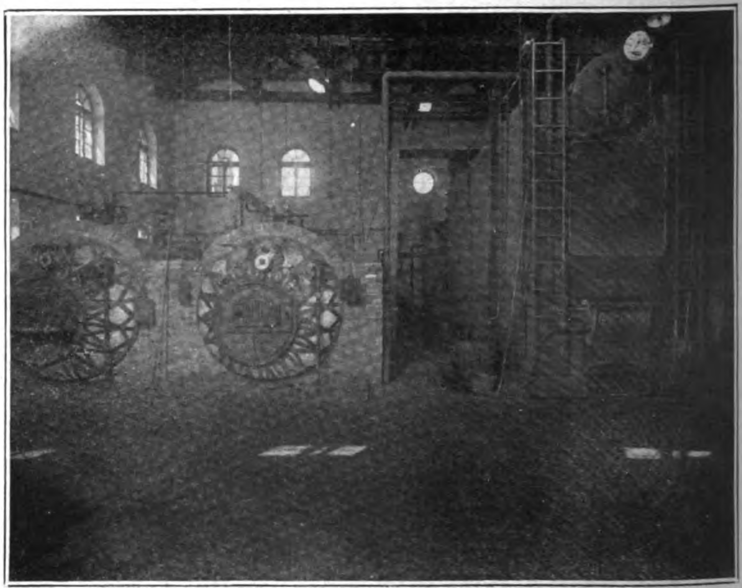
Electric-driven Pumping Engines



Pipe Gallery for the Rapid Filters Underneath the Platform



Electric-driven Air Blowers and Centrifugal Pumps for Cleaning the Beds of Rapid Filters



Interior of the Boiler Room of the Pumping Plant

Therefore, in October, 1905, the first extension program was drafted. Work was put in hand in th following year (1906) at the estimated outlay of Y.1,060,000. It was completed in March, 1910.

This extension work involved the construction of a blind dam at the Shahokou water source and of a new settling reservoir and a filter bed, the installation of a new pumping station, the laying of a 16 inch forcing main pipe from Shahokou to the service reservoir, Fushimidai, and the construction of a new service reservoir at Fushimidai, together with the laying of the distributing main

did not increase at some fixed rate of geometrical progression, as at so many cities in Japan and the Western countries. The rate of increase varied according to years, as might be expected of a new colony.

The population of Dairen at the end of 1907 showed an increase over the figure at the end of the preceding year by about 20,000; at the end of 1908, the increase over the previous year exceeded 8,000; since 1909, a somewhat regular pace of increase has been observed yearly, the annual increment ranging between 2,000

and 6,000. At the end of 1913, the yearly increase rose to about 10,000. At all events, the general situation of South Manchuria seemed to endorse the anticipation of a rapid growth in population at Dairen. The urgent necessity of extending the waterworks further was recognized. Under these circumstances, the second extension program was drawn up and was started as an undertaking extended over six years from 1914 to 1919.

On April 5th, 1914, preparatory work was commenced on the site of the new reservoir at Wangchiatien, and excavation work was begun on the 25th of the same month. The construction of the reservoir was finished practically on August 26th, 1917.

Before the completion of the work, in July, a heavy rain raised the water to the depth of 60-ft., and the construction work was pushed forward with concentrated energy day and night. By August 21st, the water of the reservoir went up to 73-ft. in depth, and the overflowing water created a large waterfall of 40-ft. in height over the steep cliff. The roars of the rolling water, with its whirls, bubbles and sprays, presented a splendid sight. The laying of a leading main pipe line of 20-in dia. from the reservoir to the filtration plant (淨水槽場) at Shahokou, the reconstruction of part of the settling basin as coagulation basin, the installation of new filtering appliance, the removal and installation of pumps, and the equipments for distributing water to the higher levels at Dairen were executed as expected, and by the end of 1919, by which time the construction work was to be finished, the whole of the principal parts of the work had been finished. The other minor parts, inclusive of the laying of the service pipes in the city, had been completed by the end of March, 1921, as planned at the outset.

Prior to the commencement of the second extension work, above mentioned, what with the increase of the water consumption from about 1913 and what with insufficiency of rainfall, a water famine began to be threatened, and the partial suspension of water supply had to be enforced :

Firstly, from November 11th, 1913, to March 14th, 1914 ;
Secondly, from June 11th, 1914, to July 4th, 1914 ;
Thirdly, from November 13th, 1915, to May 31st, 1916 ;
Fourthly, from October 20th, 1916, to July 31st, 1917.

In the last mentioned case, the partial suspension extended over nine months at a stretch to the untold misery of the citizens.

The authorities concerned were not idle or resourceless. They managed to draw some supply from Tayukou near Liushutun across the Dairen bay by means of water boats. Then, more supply was obtained from Ryojun (Port Arthur) in railway tank cars to fill the need of the locomotives. The effort of the authorities to make the best of the trying situation is worthy of special recognition in the annals of the Dairen Waterworks.

Since the completion of the Wangchiatien reservoir (according to the second extension program) which can hold 5,400,000 tons of water, the daily water consumption of the city of Dairen has kept increasing at a faster rate than before, but so far not a sign of a water famine has yet been seen.

Dearth of water from 1916 to 1917 was without a parallel. It was owing to the extraordinary drought extending from 1915 to 1916, combined with the sharp rise of water consumption due to the rapid increase of the Dairen population.

The second extension work, then in progress, could not be of any use before 1918, by which year the water of the new reservoir was expected to be sent to the Shahokou filter plant. Accordingly, the authorities, as an expediency, decided to found a new source at Lanchiatun (near Hsiaopingtao) at nearly eight miles west of Dairen with the object of keeping it as an auxiliary source of supply. So, in November, 1916, when the cold winter was literally at the threshold and even all kinds of outdoor building work have to be suspended, the work was started, and, in spite of the inclement weather, it was pushed on with admirable fortitude, being brought to completion on March 10th, 1917. This is what is styled "Auxiliary Waterworks at Lanchiatun." It cost Y.180,000.

The above, that is, the first and second extension works, with the Lanchiatun auxiliary waterworks, make up the existing waterworks installations. Their dependable supply capacity consists of 10,000 tons by the Wangchiatien reservoir and 2,000 tons by the Shahokou wells, which formed the first extension works (originally the estimated supply capacity was 6,100 tons a day, but the data during the dry season put 4,000 tons as a reasonable daily capacity. Since the completion of the Wangchiatien reservoir, the catchment area of the wells has been cut down by half), in addition to 600 tons by the Lanchiatun waterworks.

Calculating the per capita per diem consumption at 4.5 cub. ft. for a white and a Japanese, and that for a Chinese at 1 cub. ft., the present installations suffice for 60,000 Japanese and Westerners and as many Chinese, still leaving 3,435 tons for supply to the harbor, wharves, locomotives, the workshops, street sprinkling, fire-extinguishing, fountains, etc.

Such is a brief history of the Dairen Waterworks and the present supply capacity.

III. Sketch of Installations

(a) Water Source in the Malan

The main water source of Dairen Waterworks is located in the Malan river running through West Shahokou at nearly four miles west of Dairen.

The Malan river has its source in Antzuling mountain, held as the second highest in the Kwantung leased territory, and flows eastward, then turning to the south, empties itself into the sea through South Shahokou. It is a small river and is about fifteen miles long, its drainage area being 37.5 square miles. In dry weather, the river has but little water, but at a heavy rain, the swift murky current is very often several feet deep. In this river, there are two water sources : one, in the form of the impounding reservoir at Wangchiatien, and the other in the form of the wells at South Shahokou.

Wangchiatien Reservoir

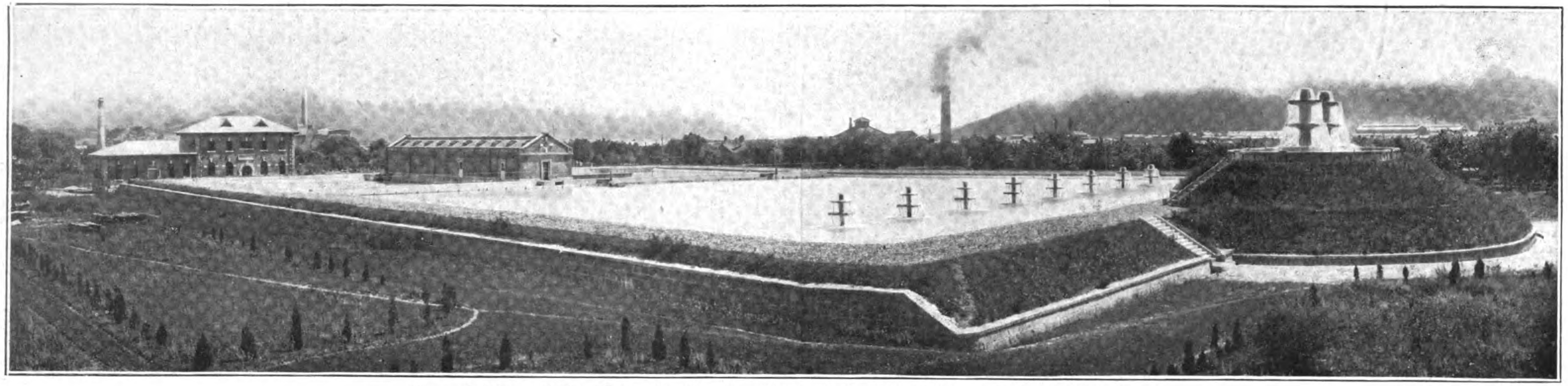
The Wangchiatien reservoir constitutes the principal source of supply to the Dairen Waterworks and is situated at Hanchiatun, part of village Wangchiatien, at 11⅓ miles northwest of Dairen.

This reservoir was constructed, as above stated, on the principle of depending upon the reservoir system alone for a steady reliable supply.

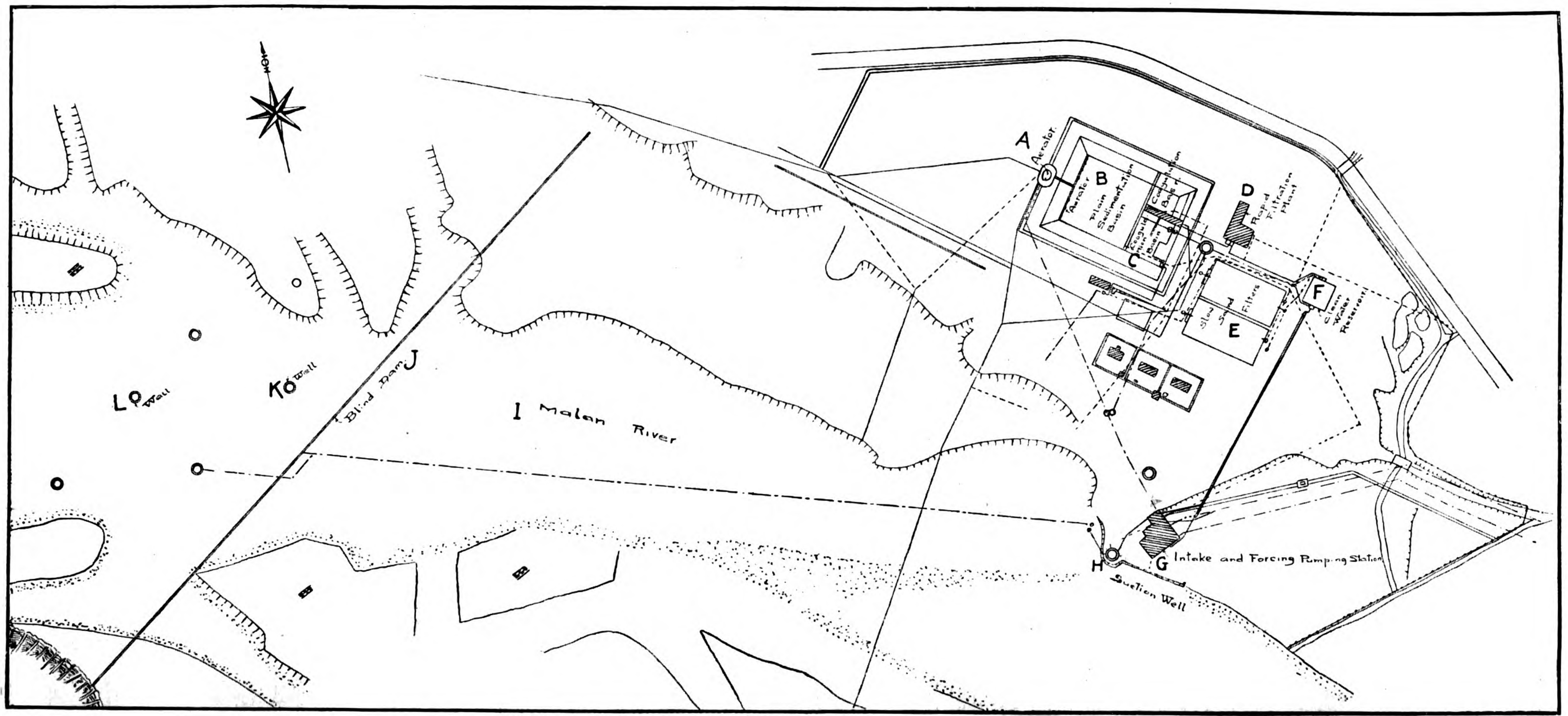
In order to determine the size of a reservoir, it is necessary to conduct a minute investigation regarding the rainfall in the drainage area, together with the evaporation, percolation and actual run-off. Accordingly, in June, 1911, a temporary observatory was founded at Chakou, in the centre of the catchment basin, in order to conduct observations of all these natural data in addition to what had been carried on at the meteorological observatories at Ryojun (Port Arthur) and Dairen. Moreover, between May, 1911, and May, 1913, a weir was constructed at Shahokou for the purpose of measuring the amount of ground water flow and, at the same time, we calculated the amount of subsoil flow by the quantity of water pumped up to the settling reservoir of the waterworks by the intake centrifugal pumps.

Thus, the actual flow of both surface and subsoil run-offs, at Shahokou, was measured, and also on the site of the new dam under contemplation, another watergauge weir was constructed. At the time of a freshet, the flood flow was measured actually. A minute survey was carried out of the catchment area to the new reservoir from May, 1911, to August, 1912.

Generally speaking, the co-efficient of discharge, i.e., the percentage of run-off to the total rainfall in a catchment area, will vary with many factors such as the season, frequency and intensity of rainfall, velocity of wind, and humidity of air or of ground. So, it is difficult to find out a rational co-efficient which applies to all conditions of the influencing factors. Therefore, there will



General View of the Water Purification Plant of the Dairen Waterworks at Shahokou

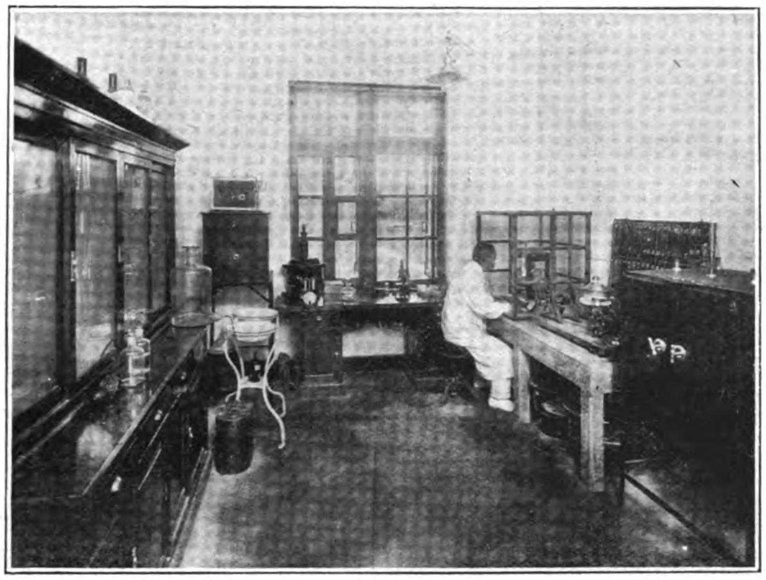


GENERAL PLAN OF SHAHOKOU WATER FILTRATION PLANT

A. Aerators
B. Plain Sedimentation Basins
C. Coagulation Basins
D. Rapid Filter Plant
E. Slow Sand Filters
F. Clean Water Reservoir
G. Intake and Forcing Pumping Station
H. Suction Well for Intake Pumps
J. Blind Dams
K. Wells

be only two ways to determine the co-efficient: (1) by determining the monthly co-efficients by the long period observation or (2) by determining the co-efficient according to the amount of rainfall in some specified duration of time.

In our case, the results of the actual observations showed that, in case of the monthly run-off being considered, it varied most remarkably according to the quantity of rainfall during the month. A curve showing the relation of monthly run-off and rainfall was



Interior of the Laboratory for Examination of Water in the Rapid Filter Plant

obtained by an analytical study of the results of the above observations. These rates of run-off were used, in their turn, as the basis for calculating the quantity of the water that has flowed into the reservoir from the catchment area during the past several years. From this amount the evaporation amount was deducted (the leakage and percolation amounts were left out of account on the assumption that there was some allowance left in the evaporation amount).

The results of these calculations were shown on a diagram, and by what is called the yield curve method, the dimensions of the reservoir in project were determined, taking into consideration the topographical features of the proposed site for the reservoir.

The dam of the new reservoir was constructed at the neck of the Wangchiatien dale where the spurs of two hills embracing the dale slope down nearest each other, and is situated at a distance seven miles from the Shahokou filter and pumping plants.

It is built of rubble-concrete and of gravity section, and in plan, it forms an arc having a radius of 1,742½-ft. in order to give it an additional strength beyond calculation, to be in harmony with the topographical features, and also to abut it to the solid rocks at both ends. The rocks at both ends of the dam, to which it abuts, are formed of quartzite of considerable hardness. The gentle slope on the left bank is availed of for the construction of both the overflow and overflow channel, which latter discharges the waste water from the precipitous cliff, some 300-ft. distant from the dam, down into the river. At about the middle of the main body of the dam (the overflow portion being excepted), and intake tower is constructed.

Within the tower, a 22 inch cast iron pipe is erected and, by means of four 10 inch branch pipes, which project out of the tower at the interval of from 14½-ft. to 16-ft., the water is conducted to the leading main pipe. The leading main pipe has the diameter of 22 inches while in the dam, being reduced to 20 inches outside the dam. The drain pipe is 24 inches in diameter, and is installed against emergency. Both the leading pipe and drain pipe are laid in the pipe gallery to facilitate inspection.

In the part of the main body of the dam adjoining the overflow portion, a projection of 6-ft. each, both above and below the dam, the total width at the top of the dam being 22-ft. with 20-ft. in length, is made. On the down stream side of this projection, a flight of steps is made down to the river bed. This is intended, in addition to necessity, to enhance the appearance and, at the same time, to reinforce the strength of the dam.

The following is the dimensions of the dam and the reservoir :—

(a) Dam

Length (overflow portion being excepted) ...	707.46-ft.
Height, maximum (depth of trench not being included)	96.00-ft.
Width at top	11.50-ft.
Width at bottom, maximum	67.43-ft.
Superelevation	5.00-ft.
Top of dam (above sea level)	282.00-ft.
Volume of the body of dam (1 *tsubo* being equal to 216 cub. ft.)	5,545 *tsubo*

(b) Over-flow Length

(of which 84-ft. being the overflow portion of the main dam and the remaining 298.3-ft. being the length of the overflow weir specially made, projecting into the reservoir on the left bank.)

Reservoir

Catchment area (1 sq. *tsubo* being equal to 36 sq. ft.)	9,435,790 sq. *tsubo*
Storage capacity (available)	5,348,883 tons
Storage space (maximum)	204,364 *tsubo*
Maximum altitute of water (above sea level)	277-ft.
Maximum depth of water	73-ft.
Effective depth of water...	63-ft.
Altitude of lowest bed of reservoir ...	204-ft.
Length of reservoir	9,900-ft.
Greatest width of reservoir	900-ft.
Circumference of reservoir	5½ miles
Number of houses removed, which would have otherwise been sunk into the reservoir	30 houses

The top width of the dam is 11½-ft. On the downstream side, it is perpendicular for the length of 13-ft. from the top ; for 9.3-ft. further down, it makes a circular segment of 30-ft. in radius, and for 6.4-ft. below it slopes at the grade of 59/100 and the remaining part at the grade of 69/100. The upstream side is vertical down to 29-ft. from the top ; for 20-ft. further down, the gradient is 6/1000 ; and for the remainder down to the foundation rock, the gradient is 2/1000.

At the bottom of the upstream side of the dam, a cut-off trench, 10-ft. wide and 10-ft. deep, is constructed. The downstream side is faced with concrete blocks, of the proportion of cement 1, sand 2, and gravel 4. The blocks are of two kinds—one being 1.2-ft. square and 2-ft. thick, and the other being 1.2-ft. high, 2.4-ft. long, and 1.2-ft. thick. Along the top, the facing blocks are fashioned in the shape of series of arches for ornamental purposes.

On the upstream side, for the depth of 40½-ft. from the top, granite blocks of 1⅕-ft. square and 2½-ft. in thickness are used, and for the rest, concrete blocks are used as on the downstream side.

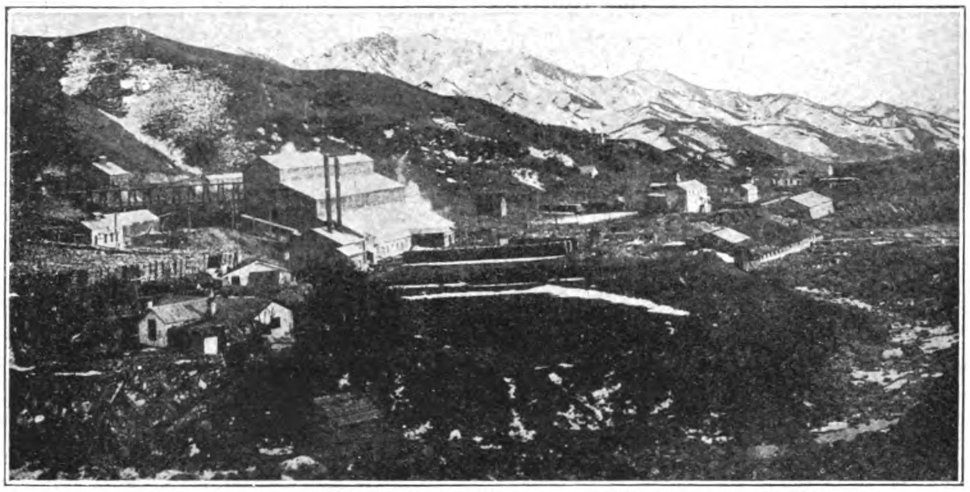
These granite stones are used to provide against the freezing action of water, as well as against the shocks which might be received from some floating objects in case of inundation and violent wind. The thickness of joints is half an inch, the mortar used being of 1.2.

(To be Continued).

KOREA'S GOLD

GOLD mining is one of the most important industries in Korea, and until recently has been prosperous—one at least of the companies engaged therein having paid 50 per cent. dividends for many years. The present state of the industry is now described as precarious in a report furnished by His Majesty's Consul-General at Seoul (Mr. A. H. Lay, C.M.G.) to the department of overseas trade. Until recently no sign of improvement was noticeable in the adverse conditions which first set in during 1918, and of which the principal factors are—

1. Increased cost of labor and supplies.
2. Provisions of the mining law of 1915 adverse to foreign enterprise.
3. Taxes of various kinds.
4. Restrictions on timber-cutting for fuel purposes.
5. The financial depression.
6. Bad transportation facilities.



The Oriental Consolidated Mining Company's Gold Mine in the Unsan District, North Heian Province

With regard to the first factor, wages have increased on the average 50 per cent., and at the same time an eight-hours day has been substituted for a 12-hours day at the new rate of pay. Of the two kinds of labor employed, Korean and Chinese, the former has deteriorated in quality. Since the political troubles that broke out in 1919 the Korean has become restless and is no longer as amenable to discipline as formerly. There have been strikes in all the mines, an occurrence unknown in earlier days.

Chinese Labor

Chinese labor, which was once cheap and plentiful, had not returned in 1919 and 1920 owing to the rise in the price of silver. The Chinese remit their money home, and it does not pay them to work in Korea when the purchasing power of the yen falls considerably as compared with the dollar. Silver has now again fallen and the Chinese will probably return.

The mining laws of Korea do not in themselves compare unfavorably with those of other countries, notably America, but foreigners suffer a very real disadvantage in that they are unable to register claims in individual names, but must employ a Korean or Japanese as nominal owner. The former foreign concessions may transfer their claims to other foreigners by special treaty privilege, but in order to register new claims, they must first form a Japanese company. It is clearly not desirable to form a company until a claim shows sufficient gold-bearing ore to justify the step.

Taxes and Restrictions

The principal taxes which operate unfavorably are as follows:

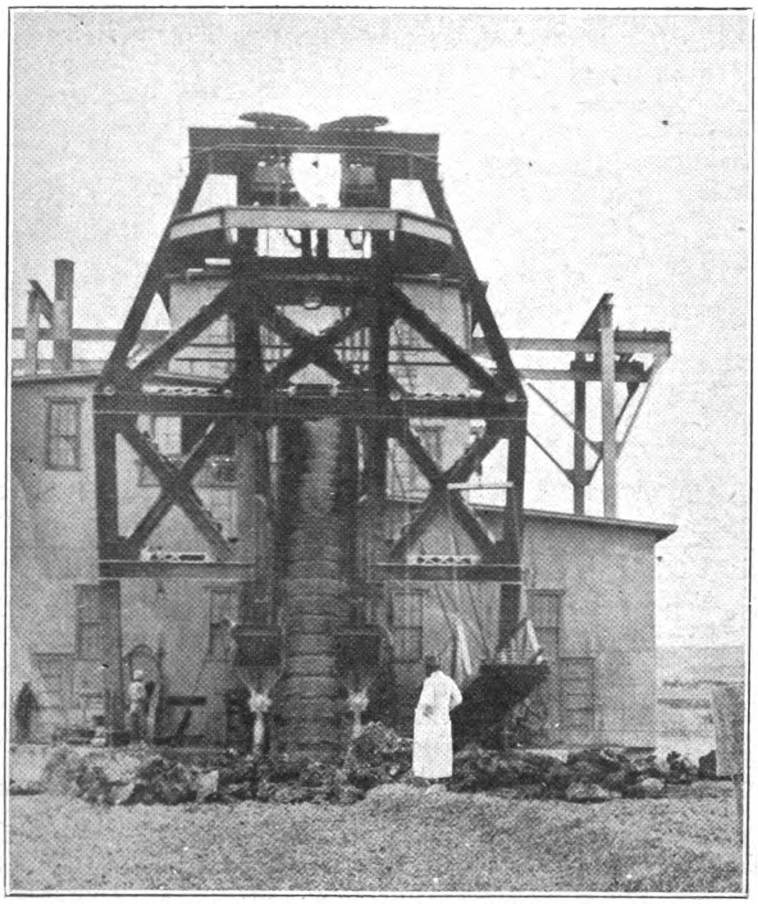
Area (or land) tax, 60 sen per 1,000 *tsubo* (1 *tsubo*=36 sq. ft.)

Royalty, 1 p.c. on value of gold produced.

Income tax, 7½ p.c. on net profits (companies registered in America pay double tax).

With regard to the restrictions on timber cutting the governor-general of Korea is very anxious to reafforest the country, which has been denuded of trees in the course of centuries. The lack of trees leads to disastrous floods at the season of heavy rains, while their increase will bring about in time a more even distribution of the rainfall. Cheap fuel is an important item in Korea for all mining industries, and the principal mines are distant from the railways and the transport of coal adds considerably to costs.

In this connection, it may be noted that, of the five foreign mining concessions operating, three use coal only for motive power, one wood only, and one uses hydro-electric power. Coal in 1914 delivered at the mine cost Y. 6.50 per ton, and in 1920 Y. 23.00 to Y. 35.00.



Chiksan Gold Mines: Korea Front view of Gold Dredge showing heavy steel structure—Front Gantry and bucket line digging 22 feet below surface

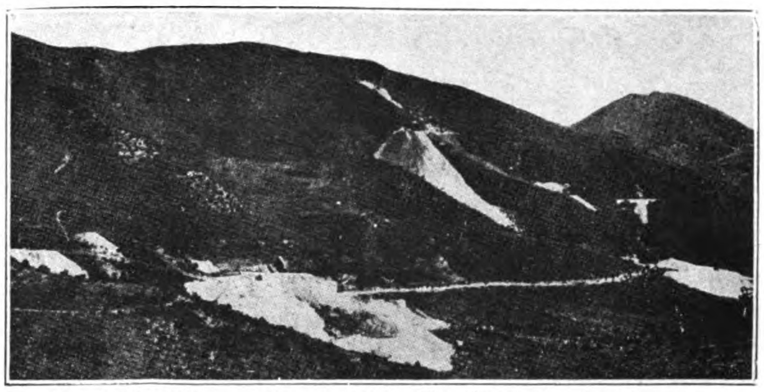
Mines in Operation

At the present moment the gold mining industry is principally in foreign hands, chiefly American. Some of the companies are, however, worked partly with British capital. Approximately 30 per cent. of the shares represents British money.

These companies are:—

(1) The Seoul Mining Company.

The Main Portal of the Suan Mine: The Seoul Mining Company



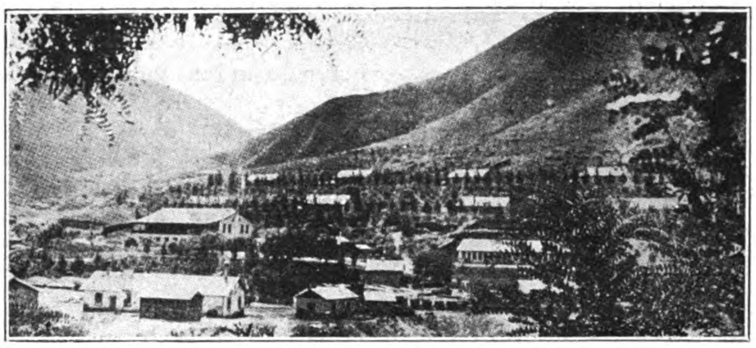
The Tul-Mi-Chung Mine in 1918: The Seoul Mining Company

(2) The Oriental Consolidated Mining Company.
(3) The Chiksan Mining Company.
(4) The Asian Mines, Limited.
(5) The Concession Miniere Française de Taiyudong Chang-Song.

Of the above :—

(1) The Seoul Mining Company has its chief mine at Tul-Mi-Chung, about 50 miles east of Pyeng-Yang. It operated at a loss in 1820, when Japanese and American taxes had been deducted from the gross revenue. Operating costs (exclusive of taxation) amounted to G. $5.9378 per ton of ore. It works six mines. The mine at Suan, one of the best in former years, has now been practically worked out.

(2) The Oriental Consolidated is situated at Unsan, about 60 miles north-east of Ansho. Its operating costs worked out at G. $3.67 per ton of ore. Dividends of 5 per cent. were paid.



The Foreign Residences at Tul-Mi-Chung: The Seoul Mining Company

(3) The Chiksan Company is situated at the place of that name, about ten miles from Seikwan on the Fusan-Seoul main line. It paid dividends of 8 per cent.

The above three companies are American.

(4) The Asian Mines is registered as a Japanese company and is worked and owned by British capital. It is situated at Yang Duck, about 50 miles east of Pyeng-Yang. So far only prospecting has been done.

(5) The French Company suffered a small loss in 1920. It is privately owned and the capital, so far as is known, is entirely French. The mill was shut down during 1920, but it was to resume work on May 1 last. The mine is situated at Taiyudong, about 15 miles north-west of Unsan.

Japanese Companies

Several purely Japanese companies have at various times and places endeavored to extract gold, but their wasteful methods, particularly in the number of the staffs employed and the want of knowledge and experience, have caused them to fail in every instance. The Japanese are now turning their attention to the development of other minerals, such as copper (found in most of the gold mines), tungsten, graphite and especially coal. As early as April, 1920, applications for gold-mining claims had ceased and 50 per cent. of the claims registered were for coal.

A not inconsiderable quantity of gold is extracted by native workers, both miners and placers, using primitive tools and with little capital. They succeed in obtaining gold in the small lodes and in good mines where gold can be extracted without the use of much machinery. The Koreans have a natural instinct for gold-mining and will frequently judge the capacity of a vein sooner than the trained experts, but they fail when scientific methods have to be employed, as, in common with the Japanese, they have no proper knowledge of the use of machinery and explosives. Some of the native workers sell their output to the foreign concessions under contract.

The Suan Mines: The Seoul Mining Company

The Far Eastern Review

A Monthly Review of Far Eastern Trade, Finance and Engineering, Dedicated to the Industrial Development and advancement of Trade in Far Eastern Countries

ENGINEERING FINANCE COMMERCE

5 JINKEE ROAD, SHANGHAI CHINA

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The American Court and Extraterritoriality

WHEN so prominent an American newspaper as the *Herald* of Boston, Mass., announces editorially that the coming investigation into the American court dispute at Shanghai offers a suitable opportunity to consider the whole question of the court in China having in mind a complete withdrawal and the placing of all Americans under the jurisdiction of the Chinese courts, then indeed the time has come for a frank discussion on the subject in these columns. The *Herald* says that President Harding cannot but regret as much as any one the necessity for an investigation of conditions in the United States court at Shanghai. But as he has felt it his duty to issue the order, the inquiry will doubtless be thorough, with a view to rectification of whatever may be wrong, and prevention of similar occurrences in the future. Americans in China whose pride of country is such as to deplore a public attack upon the government's representative must feel, while they deplore, that respect for authority will suffer, dignity of office will be ridiculed and lowered and, last but not least, the application of the law so demeanoured as to make of the unfortunate episode an example whereby a claim for the abolition of extraterritoriality can be supported. It is not proposed to register a partisenship in these columns except in so far as to make the statement that however necessary an accusation of distrust against the court might have been, the abrupt and public manner in which it was done surely reflects a mind ill-advised. If, as it is claimed, the United States court at Shanghai can actually be credited with propensities which call for distrust, surely there is a better way to effect a remedy than to besmearch American repute by a process at once passioned and startling. It is not necessary at all for Americans to apologise for Americans in an international community in itself not immune to apparent misrepresentation of the law, but it is necessary for Americans to make an attempt to prevent a recurrence of a spectacle that may be used as a wedge to deprive them of the privileges of extraterritoriality. Already the *Herald* of Boston, Mass., inquires, "While our state department is looking into the conduct of this American court in China, might it not advantageously consider the whole question of our courts in that country?" It goes on to say "caution at first may have dictated our imitation of the European powers in their relations with China. They distrusted the Chinese administration of justice, and insisted on setting up courts of their own at the capital and the treaty ports for the trial of all cases, both civil and criminal, in which any of their nationals were concerned. That assumption of European superiority, plainly implying Asiatic inferiority, has never been conducive to friendship between the peoples of the occident and those of the orient. Japan tolerated the system of foreign consular courts for a good many years, but at last she resolutely declared that it must cease, and therefore extraterritoriality for foreigners in Japan was abolished in 1899.

"The Chinese have chafed under the same system, and are intent on getting rid of it. They are not now a dumb mass under a Manchu autocracy, and the nations will be wise that treat them as a self-respecting and a self-governing people, consolidating their power as an independent republic. In this matter of the exclusion of foreign law courts they have begun with Germany, the nation whose ruler not much more than twenty years ago said to his soldiers: 'Use your weapons in such a way that for a thousand years no Chinese shall dare to look upon a German askance. Be as terrible as Attila's Huns.' Germany has agreed in the treaty of peace with China that there shall never more be German courts in that country, and that Germans residing there shall be subject to the jurisdiction of the Chinese courts, except in civil disputes among Germans only, which a German minister or consul may decide.

"China will propose the inclusion of similar provisions in every new or revised treaty to which she is a party. We have given her several practical proofs of our friendship. Perhaps she would think it the crowning proof if, without waiting to be asked, we arranged for the withdrawal of United States courts from her cities and the acknowledgment of her national courts by American residents. A full consideration of the *pros* and *cons* by the president and the state department is desirable, and it is suggested now because the Shanghai investigation appears to offer a favorable opportunity."

With all due deference to our friends the Chinese and with an expression of admiration and respect for the great soul of the people, it must be stated that the benefits of extraterritoriality are not mythological. Many are the factors which might be presented in an argument designed to support this contention, all so obvious to the sojourner in China that they need not be enumerated herein, but for the benefit of the American in the homeland whose *largesse* prompts at all times a stand in support of a China entirely for the Chinese and untramelled by the influence of the foreigner, it might be wise to point out one serious consequence of a rescinding of the present treaty. Maladministration of justice so acute as to make business intercourse almost an impossibility. And it is business which has lured, and still lures, the American to China's shores.

It is unfortunate that evolution does not spin its way along with greater velocity. If it did the result of China's later day upheavals might already have made this protest against the abolition of extraterrioriality unnecessary, for there is no doubt that the storm which has centred, and still centres about China, will, in the course of time, make of the people their own masters. There can be no doubt that with all their short-comings, short-comings not unknown by any manner of means in the greatest countries of the world, the Chinese people are essentially fitted for peaceful and competent progress. Naturally lethargic, this progress will be slow, nevertheless it will be in keeping with all the conditions of the country, which, until the western world has inculcated modernism with greater promise of benefit to the country as a whole than modernism has benefited itself, must of necessity remain, in the eyes of the foreigner, squalid, unproductive. In the eyes of the Chinese their methods of living and environment are quite acceptable so much so that a calm contentment is evidenced throughout the whole breadth and length of the land, a contentment which is not duplicated elsewhere in the world. If the foreigner were placed in the position where his welfare, in respect to the law, was in the keeping of this great peace-loving and law-abiding people, then there could be no reasonable opposition to the abandonment of extraterrioriality. Were the danger of not being imposed upon incurred in graciousness of spirit, gentility, and consierateness, the status of international intercourse would be greatly different to what it is to-day. This defect in the make up of human nature, especially evident in the white races of the world, has made of boundaries, armed barriers; of intercourse, a matter of sharp edged diplomatic skill; and of the people of the world, as a whole, prey to savagery. Militarism of the unbridled type, such as has long been encouraged in China by the supply of arms and ammunitions from abroad, found itself entirely unchecked after the overthrow of the Manchu dynasty with the result that selfishness, greed, complete disregard for manly and lasting virtues and for justice in any form, prevail as masters of a

peaceful people. Until this element of arrogant irregularity is removed there can be no possible relinquishment of the privileges enjoyed by the foreigner under the extraterritorial law. There are signs that this great country will lift up and discard its oppressive burden, and when this time has come the foreigner abiding in China will be the first to applaud and to welcome complete Chinese administration unfettered by treaty rights and other embarrassing reservations.

There is a tendency both in Europe and America to view the privileges as enjoyed at present by the foreigner in China as matters of unwarranted imposition. They would be if conditions did not make of them absolute necessities, a factor generally lost sight of in the sentiment sprung reasoning of the distant onlooker. The fact must be emphasized that the time is not ripe for even a slight unloosening of the foreigner's treaty rights in China much as the wish might influence the deed, and a step in this direction would be foolhardy, tantamount to a recognition that existing authority, an authority unquestionably abhorrent, marks a status of sublimity or a level of superiority unattainable by any other form of government. No one who knows China can agree that such recognition should even be thought, let alone extended.

And so it is that any movement towards the abolishment of extraterritoriality must be attacked as being ill-advised, premature. The time will come, no doubt, when the subject may be embraced with perfect assurance of safety. This time is not now, and will not be for many a day. That the American court episode in China should form a comparison whereby the administration of Chinese justice might appear to advantage, that it should form a stepping stone to relieve the rights of Americans in a misgoverned country, are factors which must be deeply deplored, deeply resented, by all who have the interests of their own country, and of China, sincerely at heart.

C. L.

* * *

Conciliation

A SPIRIT of conciliation is becoming manifest all over the world. The cynic will have it that this comes through necessity; that there is no other way out of the tremendous burdens that weigh down the world and the alarming calamities which threaten mankind. In other words, he thinks that selfishness and the eye to the main chance have again, as they always have done, prompted a desire for the relinquishment of the policies and ideas that guided the world before the great war.

Human nature is a strange driver. With whip in hand he has urged the old horse until lathered chest, panting flanks and a marked decrease in pace have combined to question the possibility of his arriving at any destination ; whether or not there will be a breakdown on the wayside where the wolves and the mighty birds of the air will growl and hiss at each other over his carcase. This incautious riding over rough roads, disregard for obstacles which, if respected, might have delayed exhaustion until nearer the journey's end where the possibility of rescue would have been greater, indicates a desire for suicide. His mania for speed, for achievement at all costs, have blinded him. The sweat of his brow drips over his eyes and he plunges to his destruction, but no, the old horse begins to lag, no longer is urged by the cut of the whip. The old cart joggles where it previously rocked and is in danger of breaking to pieces. The driver pauses to wipe the sweat from off his brow and the old horse slackens considerably.

This little parable portrays man's work upon the world. Both he and the world are tired and the road before them is dark and dangerous. And if he does think of himself and the morrow, it is a selfishness that is a wise one, so the cynic may sneer if such is his desire. It will not effect the issue. As the thirsty seek for water and the pained seek relief, so now does the world seek rest. After the war there came a period of extreme and unwarranted optimism, when everybody in the allied countries rejoiced so greaty over the defeat of Germany that cool, collected reason was almost entirely eclipsed. That dreadful spectre of Teuton domination having been overthrown, the world was apparently about to settle down to perpetual tranquility and the attainment of universal brotherhood.

And this might have been, but to quote from the *Traveller* of *Boston*, Mass.:—

"In the peace councils, the beautiful came face to face with the practical ; the vision of brotherhood was more or less defaced by the very mundane contentions of rival governments cherishing old hatreds and aroused to new ambitions. The outcome was a treaty of peace, coupled with a league of nations covenant, both of which reflected the admixture of idealism with sordid reality. Thus another phase of bickering and contentiousness was already manifest while the treaty was in the making. And in a few months the first phase of optimism had passed completely over into the second phase, of bitter conflict. In the United States, intense heat was generated over the issue of treaty ratification. Of course, if America had assented at once to the treaty, less difficulty might have been experienced abroad in tying up the loose ends and securing German compliance. On the other hand, it can be claimed that there would have been a reaction in Europe, an era of quarrelling over the treaty. no matter what the United States had done. No one can say for certain what would have happened. But we know what did happen. Germany raged wildly over the iniquity of the peace pact. Italy flared up on the subject of Fiume. France grumbled and threatened. China pointed to Japan and cried 'Stop thief !' All nations had their domestic troubles over strikes and high prices and natural or artificial shortages of food and other necessities. Great Britain was in turmoil over Ireland and other parts of the empire that threatened to break away. The situation is too near and too familiar to require further description.

"Now at length, by some mysterious process, the world enters a third phase. Strife has to some extent subsided. That early optimism, having none too sound a basis, has not reappeared. Perhaps it is best that it should not. But new and more substantial hopes are being built upon the facts that Germany has consented to fulfil the treaty ; that industrial disputes are less in evidence ; that prices have begun to decline ; that France and England are reaching an agreement on Upper Silesia ; that Ireland and England have resolved upon an attempt to negoitate a peace ; and that America's influence for harmony in international affairs begins to be seen once more as something potent and sincere.

"The world will continue to have its downs and ups. At present, speaking in a broad sense, it is neither 'up in the air' nor 'down in the dumps.' Rather, it may be said to be climbing, slowly but surely, to its feet."

Particularly is this last paragraph to be noted. Our friend the driver cannot relieve himself suddenly of that mad desire for speed, the exhiliration of conquest, and when his old horse shows signs of revival he will without doubt flay him as unmercifully as he has ever done in the past, but the fact that he has paused, has wiped the sweat from off his brow so that he can better see the perilous road that lies before him, and is for the time being disposed to tolerate the slow amble of "old biddy," proves that there is conciliation in the air. Hope arises that with each pause in their progress will the driver and "old biddy" view each other less as tyrant and beast. It is not vain to hope that in time both will be so intent upon a correct progress to their destination that there will be no flayer nor flayed, with a respect born of a similar ambition, to guide them.

The Pacific conference marks just one of the world's pauses in its hectic rush towards its destiny. The great powers of the world have agreed to assemble at Washington on armistice day, November the eleventh, at the invitation of the government of the United States of America, all ready and willing to seek a means whereby "old biddy" may be relieved of a part of her excessive burden. No doubt it is their own good which stimulates their spirit of conciliation, but what of it ? Shanghai was not built in a week, and it must not be expected that altruism can assert its influence when the driver of "old biddy" has only just emerged

from an orgy of passion so wild as to have well nigh killed them both. And his nether eye still glares, for are not the Jobs of the world already visualizing the failure of the conference, and have there not been little efforts to safeguard against losing what has been gained in the long drive of the past? But the glare is not too withering, the Jobs not too convincing and the little efforts not too spirited, that the world need expect any adverse result from their influence, in fact there is this very promising haze of conciliation enveloping everything, that optimism, tempered with a certain reserve and tolerance, may be indulged in with safety.

C. L.

* * *

Manchurian Steel Works

ALTHOUGH the report of the American mining engineers who recently inspected the Manchurian coal and iron fields has not been made public, it is learned that as a result of their investigation, the South Manchuria Railway Company will proceed with their original plan of erecting the largest steel works in the Orient. The scheme as reported contemplates a consolidation of the Anshan Iron Mines and Steel Works operated by the South Manchuria Railway Company with the Penchihu Colliery and Steel Works, a Sino-Japanese enterprise controlled by the Okura interests of Japan. The low-grade iron deposits in Manchuria which have resisted profitable working under existing methods are expected to yield profitable returns by the introduction of a new American process plant. When the party of American metallurgists passed through Seattle on their way out to examine the Manchurian deposits, the statement was made by an official of the South Manchuria Railway, that, if their report was favorable, it would mean the expenditure of over $110,000,000 in plant and machinery, the bulk of which would be shipped through the port of Seattle. The expenditure of such a huge sum in Manchuria to place in execution the plans for the new industry will have a far-reaching effect on engineering trade in the Orient, as it is expected that the new plant will be able to furnish all the steel products required for the extensions of the South Manchuria Railway system, the Chinese Eastern and Siberian railways, as well as other enterprises in China proper.

The proposed plant will surpass the present Japanese government steel works in output and deprive Hanyang of its lead in China. With the proposed Kailan steel works in North China and similar projects for Kowloon and South China, the contest for the supply of steel to Eastern Asiatic markets, must, in time, simmer down to one between British and Japanese interests. What effect all this will have on the prospects of other nations supplying China with her railway material requirements, can be best left to the imagination. Japanese enterprise in this connection simply strengthens the position of THE FAR EASTERN REVIEW, in that unless foreign manufacturers are assured a proportionate share of the orders for materials used in the construction of Chinese railways financed by the consortium, it may be exceedingly difficult for the latter to function along the lines originally designed for its operation, without creating friction that will seriously impair its usefullness.

* * *

China's Guardian

MR. Guy Morrison Walker, author of a series of articles entitled "Why America must Fight Japan," is, like others of his school, always seeking to create a situation that will force the United States to take over the guardianship of China and fight her battles. The latest suggestion along these lines is contained in a letter dated June 21, directed by Mr. Walker to President Harding, in which he says:

"There is in the present situation a remarkable opportunity to benefit and aid China and to secure for our own government some security for the enormous sums that we have advanced to the European powers.

"My suggestion, therefore, is that you have the secretary of the treasury advise the governments of Great Britain, France, Italy, Switzerland, Belgium, Holland and Germany, that he will accept at their present current prices all Chinese government bonds owned and held by them, or their nationals, for credit and payment on account of the sums due by them to the government of the United States.

"By doing this you can make our government almost the sole creditor of the Chinese government, and put us in a position to relieve China from the pulling and hauling of these different powers, and challenge the validity of the so-called loans, which are, in fact, nothing but bribes claimed by the Japanese government.

"I have given the matter considerable thought but do not care to go into detail in connection with it until I learn that your administration is interested sufficiently to give the matter serious consideration."

What a fine thing it would be for the United States to reverse her traditional policy towards foreign investments, and become the preferred creditor of China, and then challenge the validity of loans which at some time or other have been opposed by Chinese political parties as inimical to the national interests? In this category would fall the Reorganization Loan of 1913, which was strenuously protested by the southern party, and employed to large extent by Yuan Shih-kai in suppressing the parliamentary party. If the Chinese should default in the payment of interest or principal on these loans, or the tuchuns confiscate the salt or other revenues allocated for their security, the picture of the American government holding the club over China, when it refused to intervene in Mexico to protect national investments, would add to the gaiety of nations. If protests after protests on the part of the collective powers are unable to deter the tuchuns from appropriating revenues so urgently required for the liquidation of central government obligations, we wonder how the American government single-handed would be able to convince these jolly old free-booters of the error of their ways.

* * *

The Other Side of Japan's Rule in Korea

SIGNS are not wanting to indicate that a reconciliation between Koreans and Japanese is resulting from the liberal policy of Governor-General Saito, and that this much to be desired outcome to recent political misunderstandings, will be accelerated by the economical development of the peninsula under some form of co-operation in which Japanese capital and technical direction will be utilized on a large scale. Whatever hardships the Koreans have endured as a result of Japan's repressive measures against political agitations and revolutionary plots, would seem to have been more than offset by the prosperity brought to the country through the development of agriculture and industries, since the annexation in 1910. Statistics are not always interesting reading, but where they point in unmistakable terms to the benefits of enlightened government they are worthy of more than passing interest. In Korea, especially, they tell a story that should be read in order to appreciate the true inwardness of the other side of Japan's rule in the peninsula. To those acquainted with the old order of things in the Land of the Morning Calm, where the people were the prey of the officials, and it was courting death and torture to possess property or show any outward sign of wealth, the development of the country will come as evidence that the natives are enjoying a material prosperity undreamed of a decade ago.

Remarkable progress has been made not only in the output of manufactured articles but in the ideas of the people towards the necessity of industrial development. The value of industrial products increased from Y.300,000,000 in 1911, to Y.1,760,000,000 in 1919, while trade through the open ports rose from

Y.59,000,000 in 1910 to Y.500,000,000 in 1919. This increase, although partly due to inflated prices of recent years, arose in the main from increased production. The agricultural products of the country valued in 1910 at Y. 240,000,000 increased to a value of Y.1,380,000,000 in 1919 or nearly 600 per cent. This, in itself, is one of the most convincing proofs of the prosperity of the people, yet, notwithstanding the great increase of wealth from this source, new methods of farming, proper selection of seeds, extension of irrigation systems and reclamation of waste lands will more than double the crops in the course of a few years.

The value of forest products increased from Y.19,000,000 in 1910 to Y.30,000,000 in 1919. During this period over 650,000 acres have been planted with trees and a program of reforestration is being carried out which in time will help to restore the former wooded wealth of the peninsula, of whose total area at least seventy per cent. is available for reforestration. One of the most remarkable increases is seen in the development of the fishing industry valued in 1910 at Y.6,000,000 and which in 1919, rose to Y.71,000,000. Surrounded on three sides by seas abounding in fish, the application of more modern and efficient methods of catching and curing will bring still larger returns to the country. In mineral deposits, Korea is specially favored and the output of gold, iron and graphite, although worked on a very limited scale increased in value from Y.6,000,000 in 1910 to Y.25,000,000 in 1919.

In manufactured goods the same steady healthy growth is seen, increasing in value from Y.30,000,000 in 1910 to Y.260,-000,000 in 1919, yet notwithstanding this satisfactory development a huge amount of manufactured goods are imported annually from Japan and elsewhere. In finance, traffic and transportation, great strides have been registered, but a still greater program is necessary to meet the constantly changing conditions.

In order to meet these conditions and draft a comprehensive industrial policy for Korea that will promote its economic welfare and benefit the people and at the same time advance the interests of Japan, a committee was recently organized to discuss the situation. As a result of these sessions a general policy of co-operation and co-ordination has been drawn up which provides that the industrial expansion of the peninsula should harmonize with the industrial policy of the empire. The keynote of such development is to be Japanese money and guidance working in harmony with Koreans, and if the latter enter into the program in the right spirit, the figures for the past ten years indicates that an era of unprecedented prosperity awaits them.

The economic situation in the peninsula during the past year, like other parts of the Far East, was one of profound depression calling for the exercise of the greatest care and precaution on the part of the banks in dealing with it successfully. In his semi-annual report for the period ending June 31, the governor of the Bank of Chosen says that rice, the most important staple, yielded in 1920, 14,800,000 *koku*, an increase of a little more than 17 per cent. on the production of the previous year. The cotton crop amounted to 98,000,000 *kin*, a substantial increase over the previous year. Prices, however, were lower, consequently its export underwent a great reduction compared with that of previous years. This produced an impoverishing effect on the agricultural classes but was offset by the transactions in barley, wheat and beans. Mining was anything but satisfactory, but has begun to show signs of recovery, especially with the gold mines which, thanks to the considerable reduction in the cost of production, have substantially increased their output, the export of which, in consequence, witnessed an increase of one million yen as compared with the corresponding half of last year. Fishing never showed such prosperity as it did at one time during last year, the low price of fish as well as the small catch of *mintai* (a kind of fish extensively used in Chosen) accounting for it.

Under such conditions, commercial transactions have been confined to those in pressing demand. The stocks of cotton and sundry other goods laid in speculatively by merchants during the period of great prosperity have, however, nearly been disposed of in one way or another to the great relief of those concerned—a fact highly gratifying from a financial standpoint. The exports during the half-year ending June 31, 1921, amounted to Y.96,360,000 and imports to Y.103,630,000, a total of Y.199,-990,000, and compared with those for the corresponding half of last year, a shrinkage of 10 per cent. in exports and of 28 per cent. in imports. The principal articles of export in which reduction was witnessed were rice, cotton, fish and cattle, while those showing an increase were wheat, ginseng, cocoons, fertilizers and gold, their increase, however, falling far short of offsetting the decrease above mentioned. Of imports, those showing the greatest reduction were millet, wheat flour, kerosene oil, cotton piece-goods and coal.

The investment of fresh capital in industrial undertakings was naturally very small, the capital issued for the formation of new companies or for the extension of existing ones amounting to Y.32,-340,000 or only 15 per cent. of the amount for the corresponding half of last year, while, on the other hand, a reduction of no less than Y.5,220,000 was made in the existing amount through liquidation of, or reduction in, the capital of 13 companies. An encouraging, as well as natural, tendency in this connection is that the direction of investment began to turn from mining, navigation and commercial enterprises of a more or less speculative kind induced by the war boom to the more sober ones of agriculture, fishing and manufacture. The light-railway companies, organized in many places during previous years, and the speedy completion of whose projected lines was earnestly hoped for, were involved more or less in the trouble consequent upon the continued badness of the times. Amalgamation between some of them is now under discussion.

Plans are on foot regarding irrigation and other lines. Much light is thrown on this matter by examination of the long term loans so far advanced for the benefit of agriculture and industry by the principal institutions. Up to 1913 the total of such loans advanced by the Chosen Industrial Bank, the banking department of the Oriental Development Company, and the local agricultural associations, all told, did not quite reach 10 million yen. In 1918 it was 30 million yen, and in 1920 over 100 million yen while at the close of May, this year, it reached 123 million yen, or four times as much as it was at the end of 1918. A comparison of these agricultural and industrial funds with the commercial ones advanced by various commercial banks in the peninsula will show that, up to 1918, the former scarcely reached 30 per cent. of the latter whereas in 1920 it reached 70 per cent. and at the close of May, this year, no less than 87 per cent. From this it may easily be imagined how rapid and unceasing was the industrial progress.

Before concluding his description of the economic situation of Chosen, Governor Minobe felt constrained to say a few words with regard to his belief that a key-note of the much-talked-of Japanese-Korean reconciliation must be sought in the economic development of the peninsula. It is hardly necessary, he says, to point out that such development will not only increase the well-being of both Koreans and Japanese residing in the peninsula, but will bring about a closer relationship between the two peoples, while adding, at the same time, much to the economic resources of the nation as a whole. For such development, however, industry in general must be encouraged side by side with agriculture, for which purpose Japanese capital must be invited on a large scale. With capital, he would also like to see many Japanese come to Korea, and, settling down in the interior and commingling with the natives, engage in their trade in co-operation as far as possible with the latter. It is then, he believes, that true harmony will come to all.

* * *

American Policy in China

The Evolution of the Hay Doctrine

NOT since William H. Taft delivered his speech before the American association in Shanghai in October, 1906 have Americans listened to such a forceful exposition of their national policy towards China as was expressed by Minister Schurman before the

American association of North China at a dinner given in his honor at Peking on September 9th. Listening to the words of Dr. Schurman the fact was borne home that President Harding has been exceptionally fortunate in his selection of men to fill the highest posts under the new administration, and that if the new American representative in Peking faithfully reflected his views, the next few years will witness some startling changes in Far Eastern politics. Dr. Schurman forcibly emphasized the determination of the American government to maintain the principle of the "open door," and, like Mr. Taft, assured his hearers, in effect, that any infraction of this principle would be viewed by the American government with grave concern. In other words, Dr. Schurman reiterated a policy, which, up to the present time, has been most difficult to apply in practice, and which must now take the form of international co-operation in some form or other, if it is to work out successfully.

Dr. Schurman's speeches since he arrived in China all tend to strengthen the idea that the Harding administration places an interpretation on the Hay doctrine, which for all practical purposes, places China in a class by herself, a country to be maintained intact, come what may, until such time as her people are able to stand alone and take their proper place in the family of nations. In effect, China is the ward of the powers, and if by any mischance, her people are unable to organize a stable government that will carry out its domestic and international obligations, the powers, under the terms of the Hay doctrine, will take united action at Peking "to promote administrative reforms needed for the strengthening of the government and the maintenance of the nation's integrity." This, Dr. Schurman assures us was the conclusion of the American policy of 1899. "If the Chinese government without aid from the outside could not or would not save China, then the great powers in common would be compelled to take 'united action' to aid in saving her. With an anarchic or impotent China before them the powers could not pass by on the other side. That was too vast a menace, not only to their interests, but to the peace of the world."

Like the Monroe doctrine, the Hay policy is passing through a process of evolution and new interpretations found for it to meet changing conditions, with the difference, that whereas the former is essentially American, the latter is becoming more and more international, supported by what may be termed a Far Eastern league of nations. What was once largely a commercial doctrine designed to protect American trade and maintain the princip'e of equal opportunity has evolved into an open declaration of international co-operation not only in the execution of large financial and development schemes but for bolstering up and preserving a government brought to a chaotic state by the incompetency and greed of their own officials. The new interpretation of the Hay doctrine heralds in no uncertain voice the advent of international intervention into the affairs of China under given conditions, and opens up a question fraught with grave consequences. For no matter how disinterested and altruistic the reasons underlying the necessity for such intervention, it may be taken for granted, that a large majority of the Chinese people will vigorously oppose it and place all obstacles in the way of its success. There is reason to believe that other powers might feel reluctant to endorse such a program.

However, as Dr. Schurman clearly emphasizes, such a radical expression of America's aggressive friendliness for China could only become operative after a complete failure on the part of the Chinese to bring order out of chaos and thus solve the problems of the Orient. "Let China develop a government worthy of comparison with the best in the world and she will then have good ground for expecting foreign nations to withdraw the restrictions they now impose upon her sovereignty. The best hope of China is in herself. She must create her own renasence." Dr. Schurman furthermore expressed great confidence in the ability of China to solve her own problems, but "if the fears of the pessimists should be realized, and China should fail to abolish civil strife and develop a stable and effective government acceptable to her own people as well as to foreign nations, it would be a disaster not only for China but also for other nations and a menace to the peace of the world." The remedy for such a state of affairs, is, as he pointed out, international intervention, a drastic step on the part of the powers, made necessary not only to protect China but preserve international peace.

Dr. Schurman emphasized, and rightly, that a China with sovereignty unimpaired and territory unabridged is the first (but not the sole) fundamental condition of all right international relationships in the Orient and of the permanent peace of the world, but he hastened to add, that the principle of the inviolability of national personality while demanding respect and regard from other nations, imposes grave obligations upon the nation which enjoys its benefits. In other words, a nation which refuses to shoulder its share of the responsibilities for world peace, or whose weakness and disorganization is a constant menace to the security of its neighbors, must expect to see its sovereignty impaired by others whose vital interests are jeopardized.

Dr. Schurman's speech while breathing unwavering friendship and sympathy for the great masses of China, must compel the rulers of the country to pause and ponder seriously the full import of his message. If his words mean anything at all, they mean that sentimental diplomacy, as far as China is concerned, has reached its end, and from now on the American government, keenly alive to the realities of the situation, is determined to pursue a more practical policy. It means, as far as possible, that the United States is determined to maintain and preserve peace in the Pacific, and refuses to be railroaded into hostilities with Japan on a wave of sentimental propaganda.

* * *

"Subtle Discrimination"

"The just and considerate policy of America towards China must not, however, be construed as indicative of any indifference to our rights. What is our due, whether small or great, that we must have. It would be intolerable if others were favored at the expense of the American government, or American citizens. That would be a violation of the principle of the 'open door' and our well established treaty rights. In matters of trade, commerce and finance while we welcome friendly competition we insist that no especial advantages be granted to our detriment. American business in China is entitled to the same treatment as the business of any other power. We demand common and equal trade conditions and common and equal accessibility to markets.

"I confess that there is great difficulty in dealing with some kinds of discrimination; when it is open it is easy to apply the remedy, but it has been practiced in subtle and underhand ways, which it is difficult to bring to light and still more difficult to prevent. That is a form of discrimination against American business which has been much resented and has given rise to much ill-feeling, not only among American business men in China but also among wider commercial circles in the United States. All I can say at present is that in this as in many other matters eternal vigilance is the price of safety, and I can assure business men that they may count on the constant and vigorous support and co-operation of the legation in dealing with this evil. You will, of course, bear in mind the difficulties which in the present condition of China the legation will have to contend with in dealing with these matters. What I promise you is that we shall do our best. We are deeply sensible of the importance of maintaining your rights."

THERE is in the part of Dr. Schurman's speech, quoted above, a reiteration of charges of discrimination against American trade by methods so subtle that it is difficult to produce proofs. The same words were employed by the secretary of commerce in an official letter directed to the chairman of the United States

shipping board in denouncing the port of Kobe. We have heard the same phrase used to explain the reasons why American firms could not operate in Manchuria and Shantung in direct competition with Japanese. The answer to the accusation that the archives of the American consulate in Tsingtau were filled with the evidence of Japanese underhand methods in discriminating against American trade, was fully set forth in the February number of THE FAR EASTERN REVIEW. There was no discrimination, no record of any such practices in the archives of the American consulate at Tsingtau. On the contrary, official testimony, clear and unmistakable, proved that the Japanese authorities had placed no impediment in the way of American trade at that port.

Investigations in Manchuria also fail to produce evidence of discrimination against American traders. Americans have had a hard time to establish themselves in Manchuria, and invariably have laid their failure to underhand methods on the part of the Japanese controlled railway. In the same manner, American engineering firms who flocked into China last year and failed to make good, laid the blame on the British, who, they declared, had almost a monopoly in supplying the Chinese with engineering materials and supplies. In both cases, the fundamental trouble with the American trader lay in the fact that he was doing his best to force his way on a basis of equal opportunity into markets that had been created by the loans of other powers. As far as Manchuria is concerned, American manufacturers have derived the major benefits from Japanese exploitation of its resources, but the orders for materials have either been placed direct or through the agency of Japanese firms. Had the Japanese placed these huge orders through American firms in China, the world would have heard less about discrimination.

As it is, this "subtle discrimination" is reduced on analysis to charges that the management of the South Manchuria Railway gives preferential treatment to its own nationals. There is no actual proof of such practices, but every foreigner who fails to make good in Manchuria is firmly convinced that he has been double crossed in some way or other by the railway. One hears second-hand stories of how this or that foreign firm lost out in some way or other through having to pay a higher freight rate than his Japanese competitor, but it is impossible to run these stories to earth, or ascertain the name of the foreign firm alleged to have been discriminated against. It is all very mysterious, and has given rise to the use of the phrase "so subtle that no proof is obtainable."

If pressed for proof, the investigator's attention is invited to the fact that few American firms are established in Dairen or Manchuria, and their absence must therefore be accepted as tangible evidence that they cannot exist because of this "subtle discrimination." In other words, if Americans are unable to compete with Japan in Manchuria, it must be because of underhand practices.

At a dinner recently tendered to the new president of the South Manchuria Railway on the occasion of the visit to Mukden, the American Consul-General, Mr. Pontius, was one of the speakers. He touched upon the matter of complaints and suggested that the railway company appoint special agents at the various large commercial centres who understood English and could act at once in the settlement of claims. The idea was immediately approved by the new administration, and special agents with full powers to adjust differences are to be assigned to Mukden, Newchwang, Antung and Changchun. The special agent for Mukden will be Mr. Go, a trained diplomat, who speaks English and French.

It will be seen from this, that the South Manchuria Railway authorities are also determined on their part to practice constant vigilance in dealing with matters which might be construed as subtle discrimination against foreign trade. It is a direct answer to the implied charges against the line, an open willingness to co-operate with Americans for the suppression of alleged practices indulged in by subordinate employees to annoy or discriminate against shippers other than Japanese.

The Yellow River Bridge Scandal

ON many occasions we have invited attention to the difficulties surrounding the practical working out of a construction policy for the development of Chinese railways by international co-operation, and maintained that harmony begins and ends with the floating of the loan. When the engineer steps in, friction and jealousies arising out of the method of construction and the awarding of tenders for the supply of materials, are sure to follow. It may be possible for a group of national banks to find a body of engineers representing five different manufacturing nations who can be depended upon to sink their differences and arrive at some harmonious decision concerning the materials to be used in the construction and equipment of such railways ; it may also be possible to find a similar group of engineers all trained in different schools, who will work together without friction in their actual construction. But human nature being as it is, and with the manufacturers of the five countries behind their engineers clamoring for orders, it is our firm opinion that ideal co-operation is impractical unless provision is made to eliminate these fundamental causes that make for ill-feeling. We have had occasion in the past to stress this point in connection with the practical application of the Hukwang terms, which provided for international competition in the supply of materials, and have urged that some attention be paid to this phase of the problem in devising a practical program for the consortium, in order to assure its continued usefulness.

In support of our stand, comes the lamentable aftermath to the awarding of the tenders for the Yellow River Bridge. It is not our purrpose to go into the merits of the case, contenting ourselves with noting that the incident comes to justify our position on the broad basic principle that it is impossible to bring about harmonious international co-operation in any scheme involving the placing of construction contracts of any magnitude.

In effect, the French, Belgian and British members of the Yellow River Bridge commission brought a charge of dishonorable conduct against Dr. J. A. L. Waddell the eminent American bridge specialist on the commission, who immediatedy gave their letter to the press and courted investigation and publicity. After a reasonable length of time, specific and detailed refutation of the charges were embodied in a letter from Dr. Waddell to the association of Chinese and American engineers, which was also published with the approval of the Chinese minister of communications.

The association from the outset of the controversy supported Dr. Waddell in his differences with his colleagues on the commission.

Dr Waddell says that although he had entered plans of his own in this competition these were dropped as soon as he was appointed a member of the commission by the Chinese government. He asserts that his colleagues favored the selection of a plan that would cost $1,500,000 more than is necessary and would not be the best bridge possible.

In this controversy the fact cannot be overlooked that it was Belgian and French money which built the Peking-Hankow railway, and the subsequent redemption loan, made without provisions for the purchase of materials, was furnished by British, French and Belgian capital. Any international board of engineers, on which these three countries are represented, in the very nature of things, will present a decision favoring the tender of a manufacturer of one of these countries.

This does not imply that any injustice would be meted out to an American bidder, if his price was actually the lowest, but it does mean that everything else being equal, that award would go to one of the three above-named nations, with preference to French or Belgian manufacturers. It was a mistake on the part of the Chinese government to invite an international commission to

decide upon the design and to award a contract of such magnitude made possible by a Belgian and French loan. Ideally and ethically they were right, but the aftermath provides one more proof that ideals cannot always be applied in a practical manner.

It is unfortunate that Dr. Waddell provided the opportunity for his conduct to be misunderstood in such an important international competition, and while we can appreciate his sincerity and desire to procure the best bridge design at the lowest cost for China, the fact remains that China invited an international board to judge the designs and award the contract. Dr. Waddell's views must, therefore, give way before the majority. Aside from all other aspects of the deplorable incident, it provides a lesson, which, if taken to heart, will forstall further misunderstandings, by the application of practical methods in the place of sentimental ideas in the construction and equipment of new Chinese railways by international finance.

* * *

The Future of Shanghai's Harbor

WITH the arrival in Shanghai of Major-General W. M. Black, and Mr. P. Ott de Vries, C.E., who have been nominated for membership on the committee of consulting engineers who will advise on Whangpoo river conservancy, the efforts of the Whangpoo conservancy board in its investigations may be said to be well on the way to fruition. When the other members of the commission arrive, conferences will be held to consider and to advise upon the needs and possibilities of Shanghai's harbor.

The investigation to be pursued by the conservancy board includes a technical-economical consideration of all the technical accommodation and terminal (wharf, pier and cargo-handling) facilities of Shanghai and a report on the further harbor development possibilities at Shanghai :—

(*a*) With the approaches to and limit of draft in the harbor remaining as at present 28—30-ft.

(*b*) For the probable maximum draft of ships on the Pacific.

It was specified in the original program that for the formation of the committee one member should be chosen from amongst leading harbor specialists in the home countries by each of the leading shipping nations (including China) at Shanghai as represented on the Whangpoo conservancy consultative board, the engineer-in-chief of the board to be an *ex-officio* member. Nominations have now been made as follows :—

NOMINATED BY :	*MEMBER :*
American Member of the Whangpoo Conservancy Consultative Board.	MAJOR-GENERAL W. M. BLACK : formerly chief of U.S.A. engineers (retired), consulting engineer of the firm of Black, McKenney and Stewart, Washington, M.AM.SOC.C.E.
By British Member of W.C.C.B.	F. PALMER, C.I.E., M.INST.C.E., consulting engineer of the firm of Rendal, Palmer and Tritton, London Formerly engineer-in-chief, port of Calcutta, and consulting engineer to the port of London authority of which he was chief engineer 1909-13.
By Chinese Member of the W.C.C.B.	P. G. HORNELL, C.E., M.SWED.SOC.C.E., consulting engineer of the firm of Aktiebolaget Vattenbyggnadsbyran (hydraulic engineering bureau), Stockholm. Consulted by the ports of Gothenburg, Stockholm, etc.
By Dutch Member of the W.C.C.B.	P. OTT DE VRIES, C.E. Until recently head of department of public works, Netherlands India. Now retired.
By French Member of the W.C.C.B.	L. PERRIER, ingenieur en chef du corps des Ponts et Chaussées (Paris). For 20 years engineer on the Suez canal.
By Japanese Member of the W.C.C.B.	ISAMU HIROI, C.E., elected dr. engineer (Tokio), formerly engineer-in-chief Hakodate and Otaru harbor works and professor Tokio University. Consulting engineer to government railways. Member of harbor investigation committee, Tokio. M.AM.SOC.C.E.
Ex-Officio Member, appointed by the Conservancy Board.	H. VON HEIDENSTAM, C.E., Capt. Royal Swedish Corps of Engineers, M.INST.C.E., M.AM.SOC.C.E., engineer-in-chief, Whangpoo conservancy board.

The commission is to meet in Shanghai on or about October 15 next and will stay about six weeks.

The task before this commission is of great difficulty as it will have carefully to weigh a number of conflicting technical and economical considerations.

Amongst the principal questions are—

(1) The possibility of improving the Fairy Flats,

(2) The alternative question of a Hangchow bay approach, and

(3) The provision of improved berthing accommodation and general port improvement, even with approaches remaining as at present.

The schemes to be submitted to this committee include a general consideration of all conceivable possibilities, but more especially various suggestions for dredging or training the great Yangtze bar known as the Fairy Flats, designs for a *port de vitesse* on the Hangchow bay as an alternative to an improved Yangtze approach, and lay-outs for first-class wharf accommodation in the Huangpu and elsewhere.

It is also understood that very important and illuminating studies have been made of the economic side of the whole question.

In order to provide proper data for these projects a special department has been organized, surveys have been made on land and water over all the areas involved, hydrological and geological studies have been made, and expert engineers in the home lands have been consulted on detail problems. A series of special reports on data have been issued and the final plans and estimates of the apparently most favorable alternative projects will in a few days be ready for the commission's consideration.

The larger problem has necessarily to be considered from the point of view of the probable draft on the Pacific 30 years from now.

But even if the draft on the Pacific is to remain at 30 feet Shanghai harbor needs improved approach and improved wharfage and berthing accommodation, as well as improvement of its cargo handling.

* * *

China's Yangtze River War

THE conflict which wages on the shores of the Upper Yangtze River bespeaks of more than the ordinary summer movements that have been the order of things since the abdication of the Manchus. It is impossible to follow in minute detail the machinations which have led to the present imbroglio. At one time the idol of democracy, the saviour of the Chinese people, the popularity of General Wu Pei-fu has fluctuated till not long ago he was denounced as being the betrayer of the masses. And now there

THE SCENE SHIFTERS ON CHINA'S STAGE

Marshal Chang Tso-lin

Dr. Sun Yat-sen

Field-Marshal Tsao Kun

General Wu Pei-fu "The Hope of China"

These four represent groups who are shaping events in China at present time, who are moving the "Knight" and "Horses" till there is compromise or checkmate

grows an increasing regard for him, the factors who would sway public opinion having exposed, through too artless a desimination of their propaganda, their desire to dethrone or to elevate him as the case might be. Insensible to all this, at least in effect, the general seems to have gone about his business until now he stands at Ichang with the Szechuanese before him representing Southern influence which would force its way to the capital and overthrow present authority if it could. If, as he is reputed to be, General Wu Pei-fu is to be the saviour of the Chinese people, it is evident that this must be according to his own program and not that which Canton may wish to make for him. The Canton government shows signs of having the welfare of the masses (as far as any factor of government in China can have) just as much at heart as does General Wu Pei-fu. Each, it would seem, desires to save the masses from ruthless authority, according to a fashion not laid down by the other. In the struggle between the two, General Wu Pei-fu, the leader on the one hand, and Dr. Sun Yat-sen, the leader on the other hand, the survivor might be left with the welfare of the country unencumbered by any lack of confidence on the part of the people, and if this were all that the war on the Yangtze signified then the onlooker might see more clearly what is transpiring in China at the present time. But there are two names which are linked with the controversy between the North and the South, that of Field-Marshal Tsao Kun and of Marshall Chang Tso-lin, both, it would seem, exercising an influence over the war in the Yangtze which somewhat complicates a normal understanding of the issue at stake.

It will be remembered that Marshall Chang Tso-lin entered Peking some months ago a veritable dictator, asserting his will in all affairs of state, and weilding such power as made of the government a mere puppet show. When he retired to his stronghold in Mukden it was generally conceded that while Peking to all intents and purposes guided the affairs of state the marshal was really the power behind the scenes. His conferences in Peking with Field-Marshal Tsao Kun, in which it would appear that a compromise was effected, succeeded in curbing Wu Pei-fu whose actions at the time threatened the authority of Peking. It was this attitude of General Wu Pei-fu which first called up the cry that he was to be the saviour of the people. As Tsao Kun's subordinate, the trend of events following upon Marshal Chang Tso-lin's visit to the capital, indicate that Wu Pei-fu decided that the old adage "Discretion is the better part of valour" to be one well worth learning. How far his subjugation went it is difficult to know. Many are of the opinion that he no longer stands for those noble ideals with which he is credited and that he is the tool of the super-tuchun, Marshal Chang Tso-lin. Others contend that he has not been subjugated at all; still others that he is playing his own game, outwardly the sycophant of his seniors but secretly working himself into a position from which he may overthrow all fetters that obstruct a reconstruction of China. If these are correct, and the ideals that the general is said to possess in the way of a truly democratic government, are not mythical, then indeed is he deserving of support as much as is Dr. Sun Yat-sen, from those who would see a settled China, a China in which trade may make its way unretarded by superstition and disrupted provinces, where the traveler may move without fear of molestation, where the river steamer may make its way up and down stream without the menace of sniping and artillery fire from river banks, where a strongly developed individuality would make of the country one over which it could no longer be made the bone of contention, the tooth sharpener of such hungry dogs as do growl on the very brink of catastrophe insensible to the results of conflict. This is the China that the true world wants to see, the China that the sane in the personnel of the great powers of the world would like to help as much as their commercial efforts would themselves benefit. If this is the China that General Wu Pei-fu hopes to build up, that Dr. Sun Yat-sen is trying to make possible, then the struggle on the Yangtze may be viewed with a certain degree of optimism, with a sense of comfort that the "hands off China" policy, non-intervention and the great Hay doctrine of the "Open-door," are all wise institutions, best meeting the needs of a people who can more fittingly extricate themselves from an almost desperate predicament. But—and in China there is a marked emphasis on the word *but*—this is a peculiar country, and one never knows.

C. L.

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Dangerous Diplomacy

TOKYO, September 30, "Is it true that Mr. Lansing will act as counselor to the Chinese delegation at the Pacific conference? Is Mr. Lansing the international legal authority mentioned in Chinese notes and inspired newspaper articles who advised against direct negotiations with Japan over the return of Shantung? Does he and ex-Minister Reinsch work together as counselors of the Chinese government at Washington? Why does your government allow two of its highest diplomatic officials acquainted with all its secret and confidential papers to utilize their knowledge for the benefit of a foreign government? Suppose the Japanese minister to Mexico abruptly resigned from the diplomatic service in order to accept the post of high adviser to the Mexican government at a time when questions of great importance concerning Mexico came up for settlement between America and Japan, what would Americans say? These questions in some form or other, direct or covert, have been thrown at me by nearly every prominent Japanese interviewed since my recent arrival in Japan.

They are hard to answer. It is well known that ex-Minister Reinsch officiates as adviser to the Chinese government at Washington, and news dispatches announce that ex-secretary of state Lansing will advise the Chinese delegation to the Pacific conference. The facts speak for themselves and provide an opportunity for the creation of many misconceptions about American policy in the Orient. Behind these queries lurks the more serious one involved in the propriety of a high diplomatic official of any state utilizing his special knowledge and experience for the benefit of another government in delicate international disputes, without giving rise to the suspicion that his government is an ally of the nation benefitted by this departure from diplomatic etiquette. The Japanese cannot conceive of a diplomatic service whose officials on retirement are permitted to enter the employ of another nation, especially as advisers on international questions affecting the peaceful relations of their own and other countries concerned. The average Japanese who reads in his newspaper that Mr. Lansing and Mr. Reinsch will act as counselors to the Chinese at Washington, associates this with the existence of some understanding between the Chinese and American governments, which for all practical purposes makes the United States an ally of China. They cannot understand that the United States has no permanent diplomatic service, or, that after the expiration of their tenure of office, our diplomats are returned to private life equipped with an intimate knowledge of foreign relations and policies which they are at full liberty to capitalize by acting as counselors to other governments.

Americans must realize that Japanese comments upon our institutions are a factor in the present situation that cannot altogether be brushed aside as of no consequence. If the highest diplomatic officers of the past administration, fully conversant with the secret and confidential reports emanating from Tokyo, Peking and the European capitals, are to guide the Chinese delegates at Washington, it may be difficult to explain that our government is not in full sympathy with China and opposed to Japan. These comments reveal a serious flaw in the American diplomatic machinery, and constitute a forceful argument for the establishment of a permanent diplomatic service, or the passing of a law by congress prohibiting an ex-cabinet officer or diplomat from entering the service of a foreign government or serving them as counsel without express permission from congress. Otherwise, we are creating a precedent subversive of all rules and ethics that underlie diplomatic intercourse, a precedent that some day may be invoked and followed by other powers in a manner we would immediately resent.

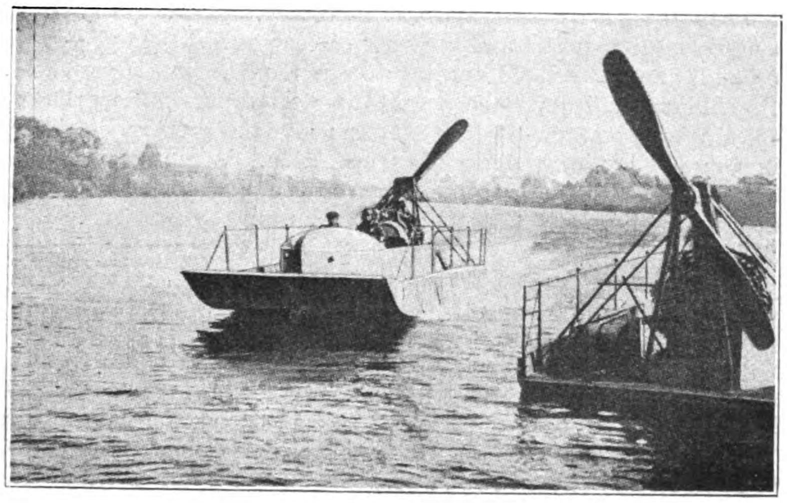
Hydrosliders in China

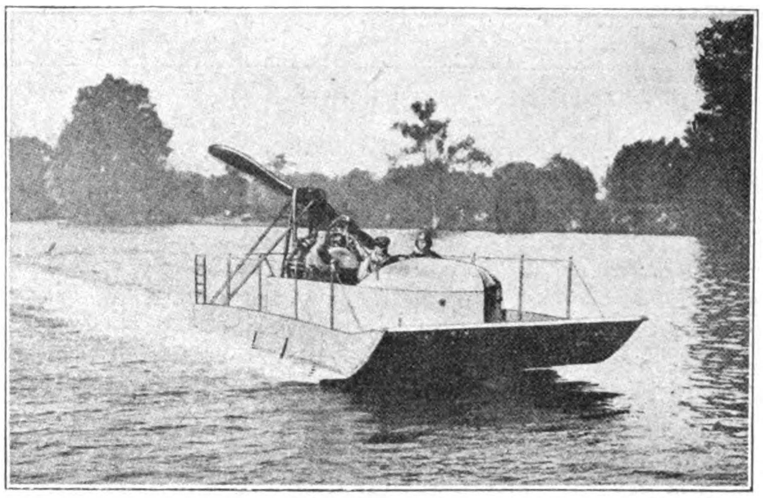
IN our September number we printed photograph showing a new type of shallow draft boat with air propeller, now in use on the Clyde. It will interest our readers to learn that such boats, known as "Hydrosliders," have also found a market in China, where a certain number of these interesting apparatus are in operation at the present time.

By the courtesy of the sole representatives for China for these type "De Lambert" apparatus, the S-te Franco-Chinoise de Constructions Metalliques et Mecaniques, Shanghai, we are in the position to show here some views of the boats in use.

The above hydrosliders are built by the well-known firm in Europe, S-te A-me des Hydroglisseurs De Lambert, Nanterre (Seine), France, in many sizes, and for different capaciousness and speed. The dimensions most in use range from 5.50 metres by 2.50 m. to 12 m. by 6 m., with a capaciousness from 200 kilos to 4,000 kilos. The speed differs from 55 to 90 km. per hour. As fuel serves benzine.

Amongst others, one of the boats has been sold to the governor at Canton, where it is in permanent use and causes much admiration. Another hydroslider has been purchased by a certain commercial concern for the purpose of carrying on regular trips on the Upper Yangtze between the cities of Ichang and Chungking, and it is further planned to establish regular communication on the shallow rivers in the interior by hydrosliders on a large scale.



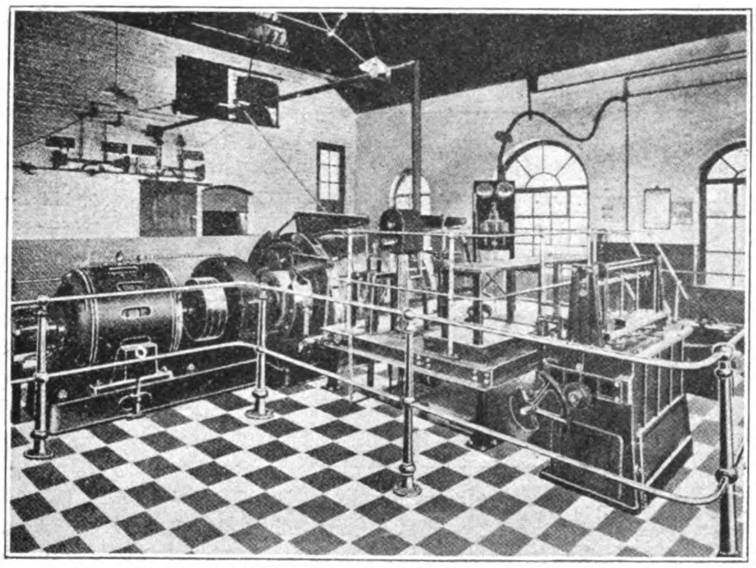


HYDROSLIDERS DE LAMBERT

1. Type XI. running at a speed of 80 km. per hour. 2. Type XI. running at a speed of 90 km. per hour. 3. Hydrosliders de Lambert with Luxury Cabin Limousine. 4. Hydrosliders in Mesopotamia during the War. 5. Hydrosliders for Mail Transport on the Tigris.

Mining Machinery in China

IT is not always that forecasts prove themselves to be accurate, the element of risk, of uncertainty, all over the world attaching to them a weight used only by intrepid speculators. In China forecasts are even more handicapped for here conditions are of so precarious a nature as to guarantee but little security in matters about which forecasts are made. It is, therefore, with a degree of hesitancy that we predict a time when mining in China will have removed from it those fetters which obstruct even a gradual development. There is evidence



Single Drum Winding Car working at a Colliery in the North of England

to support this contention but there is also evidence to refute it. We claim no greater powers of discernment than others so we feel ourselves to be accompanied in the belief that below the surface there is a barely perceptible undercurrent which will in time clear the obstructions in the shallow and almost stagnant waterway. The advantages of mining development to community and to trader alike have been recognized for many a day past and there has been no diminution in the eagerness with which each promising eventuality has been pursued because of plums that are there for the picking. The fences round the trees are thick and almost impregnable but a steady sawing can be heard and in the course of time a good entry will be made. And the pickin' will be good, so geologists have made bold to prophesy. To dispense with the further use of metaphor there is much ore below the surface scraping of China's mining districts some of which already been reached by the use of modern mining machinery. The difficulties that mining engineers meet with make it imperative that the best of machines be used in their operations. There are many types and makes of mining machinery. A manufacturer of merited prominence is Messrs. M. B. Wild & Co., Ltd., of Nechells, Birmingham, England. This concern manufactures a fine line of winding and hauling machinery besides other machines which it is our pleasure to give details of below.

Winding Machinery

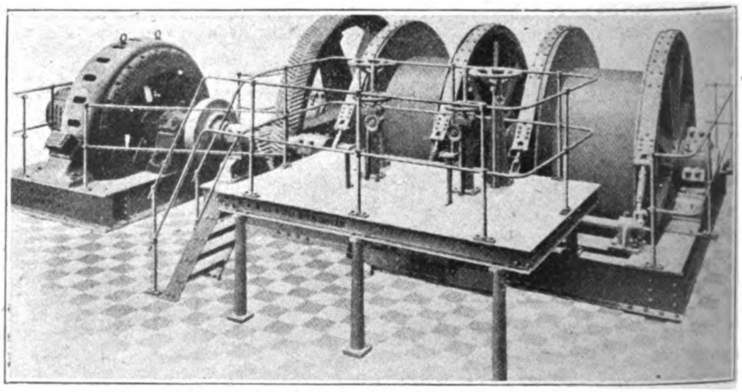
The motive power of these machines is generally by an electric motor. The bedding is of the self-contained type of cast iron box section, and it is well proportioned for carrying the various stresses of the winding operation. The bedding thereon for the shaft is properly planed and efficiently glutted to prevent lateral moving. The foundations to consist of concrete generally, and the bedding after being fixed is floated up and run solid. The shafts and pedestals are of efficient sizes all transverse and torsional strains being carefully worked out. The gear wheels are of cast steel and machine cut. The helical pattern of teeth being generally adopted. The brakes are generally of the post type, with brake path on each side of drum. The application is by foot treadle assisted by hand wheel and screw at option of attendant. Further to this, a weighted lever with trip gear operated by an electric solenoid comes into action in case of overspeeding or passing the appointed extremities of the wind. This trip can also be brought into action by the attendant if in his judgement it is necessary. The drum is made cylindrical if required and is either of cast iron sides and centres or built up of steel. According to the requirements Messrs. M. B. Wild & Co., Ltd., make a built-up steel drum of the cylindro spiral type by means of which they can give the greatest efficiency in the balance of the winding operation. Winding indicator, overwind prevention and overspeeding appliances of the most efficient type are included with the machines.

Haulage Gears

Messrs. M. B. Wild & Co., Ltd., manufacture these haulages from 10 HP. upwards, either with main and tail rope drums or with surge wheels for endless rope gear. In cases of the endless rope they can arrange them up to five surge wheels for five separate haulages on the same machine and operated by the one motor. The clutch gear for each haulage is of the friction band type which can be brought into operation without stopping or interfering with the speed of the motor.

Friction Winches

These gears have been designed with the idea of giving compactness and lightness, together with strength and durability. With this object in view, tooth gear wheels are dispensed with on the drumshaft and an efficient friction drive is introduced. There are few working parts, and the operation is by one handlever, the movement of which from the neutral position in one direction engages the friction pinion for hauling or in the other direction throws the drum on to the brake blocks. The frame is built up of mild steel plates and angles, fitted at the bottom with short pegs to act as guides, so that the machine can be placed on the tram lines and skidded where required as in the case of headings or re-opening of working places. The drum is cast iron in one piece, having gunmetal bushes. The circumference of each side of the drum is V grooved, into which the friction pinions engage. The drive between the friction pinion shaft and power unit (electric motor or oil engine) is in the case of single drum machines by means of straight tooth machine cut gearing, or in the case of the tandem drum by means of chain. The drum is mounted on an eccentric shaft, and is put into gear with the friction pinions by the handlever. The reverse movement of the hand lever brings the drum on the brake block which consists of steel angle, lined with friction lining, bolted to the framework.



600 H.P. Main and Tail Haulage Gear

Canton in the Changing

APART from its political aspect there is much of interest in the city of Canton, the stronghold of Dr. Sun Yat-sen and his followers, more especially to those who await with eagerness the embracing of Westernism on the part of the Chinese. The environment of the southern Chinese, or Cantonese, as he is better known, makes of him a type unknown in the frozen North where vitality is more concerned with combating life-killing rigor than it is in the pursuit of adventure. The Cantonese is by nature virile, temperamental and quick to embark on any project that has in it not too much of the element of risk. He seems to possess a strange mixture of shrewdness and carelessness, the former acquired through a long line of thrifty ancestors and the latter through the effect of climate upon the blood, a combination which, in the warring of each propensity against the other, has made of him a sagacious adventurer. Thus it is that the Chinese best known in Europe and America is the Cantonese ; thus it is that he is to be found in all the corners of the world, where he thrives without losing any of his Cantonese characteristics, and is able to send back to his homeland dollars upon dollars which maintain, or help to maintain, his clan, and which are the means of building up for him that little corner in the homeland wherein he will be the true lord and master when the time comes for him to return.

Canton; the Island of Shameen fronting the River

It is not surprising then that this man of broadened intelligence has adopted the teachings of the Western world with far less reserve than has his Northern brother. It is true that the industrial development in the ports on the Yangtze River and in a port of two in the Gulf of Pechili has been large but it does not seem to have come without excessive labor and pressure on the part of those introducing it. Perhaps in the past the Cantonese have seemed to embrace modernism to a greater degree than has actually been the case but whether this is so or not the fact remains that the great strides that are being made at the present time in Canton are absolutely unfettered by superstition or any other of those qualities that have made of the Chinese the arch-procrastinator of the world. It is common knowledge now that Canton is being rebuilt. The Chinese themselves have tired of the ancient, most oriental of all cities in the Orient. It has long been famous as a human hive of 2,000,000 people where there was not space for a quarter that many, a hive of narrow, swarming alleys and overhanging houses and indescribable smells and noises and crowds—the most alien sight, perhaps, that a foreigner could find anywhere in the world.

And the Cantonese have started in to make Canton a modern city. To-day there are fine, new streets, 80 to 120 feet wide, cut through the old, swarming alleys and moleburrows. The waterfront has been made one of the handsomest in the world, with big, modern buildings and a parkway three miles long. The city wall has been leveled, and in its place there is a boulevard rivaling those of Paris. Thousands and thousands of shacks have been swept away. Instead of the little, dingy shops of old, there are great department stores, equal to any in Europe. The open sewer that ran through the heart of the city has been covered with masonry and made into a driveway. On every side are seen the steam roller and the pile driver and the cement mixer.

All this has been done in two years, and the work goes steadily ahead. Millions upon millions are being spent. And the Chinese themselves are furnishing the money. They pay the expense with funds from the sale of lands that became public with the overthrow of the empire, and other public moneys, and with a levy on property-owners whose land is benefitted by the improvements.

The city has a commission form of government, modeled after the American plan. It has forty daily newspapers. It has modern schools, in which all the higher grades are taught English.

And it used to be said that China never changed, and never would !

It is doubtful whether she will—spiritually. Come may the great monuments of industrialism, the cults of Westernism and everything else that the Western world will bring to this land, but our friend the Chinaman will never be anything else but a Chinese. There need never be any doubt about this although an American newspaper of somewhat jocose propensities made the announcement recently that a Robert West had met a Rebecca East at a factory of some sorts to marry her later, said announcement being intended to gainsay Kipling's famous truth that "Ne'er the twain shall meet."

The world has seen Japan imbibe, in but a few short years, so much of Westernism as to make of her a power to be reckoned with in all world affairs. Japan has become an industrial country and as yet there is no trace of the effect upon her people that the spindle, the steam hammer, the blast furnace, has had upon the peoples of the Western world where materialism reigns supreme. The Japanese are still Japanese and there is no reason to believe that they will be anything else. The Chinese possess characteristics equally impregnable and while China may change in appearance the Chinese never will.

Of the cities, other than the treaty ports or on those tracts of land beside Chinese cities where the foreigner has settled, Canton is changing the most rapidly.

One need only get off the small river boat from Hongkong to see signs of great change in the port. There is something of the atmosphere of a new mining town superimposed on an ancient city.

The city wall has been torn down. Around the labyrinth of narrow lanes that have been the city's only streets for centuries is a belt of newly made broad roads. It is possible now to ride in motor cars as well as sedan-chairs. Inside the city houses and shops are being torn down to make new thoroughfares where the

A clean, broad street in Canton

On the way to the City Yamen

streets have been from eight to twelve feet wide. Old temples are being made over for schools and charitable institutions. Plans are being drawn for river conservancy, land reclamation and a new harbor. True, ambitious and high-sounding plans have been made in China before, and most of these plans under way at Canton are blithely indifferent to the feelings of the mass of the Chinese people, who don't particularly want change, but now, at least in Canton, the plans are being made by men who sincerely want to carry them out and have begun to do so.

It would be interesting to refer in detail to some of the things that have permitted the title of this article, "Canton in the changing." To take the old city wall first:

The most recent sign of progress in Canton is the removal of the city wall, making where the wall formerly stood, a wide road on which before long an electric tramway will be in operation.

The total length of wall is nearly six miles. The wall about the old city had an average height of 24 feet, with a width of 35 feet at the top and 43 feet at the bottom. The wall of the new city was about 15 feet high, 13 feet wide at the top and 17 at the bottom.

The work of removal which involves some 800,000 cubic yards was begun in December 1918 and was under the direction of H. L. Wu, a graduate of the Canton Christian College, who has also studied civil engineering in the United States.

The earth was shipped out mostly by small boats on the various water-ways around the city, while the more useful materials, such as stone and brick were turned over to the municipality by the contractors. Six thousand laborers were engaged on the work, receiving wages at 20, 30 and 50 cents silver per day.

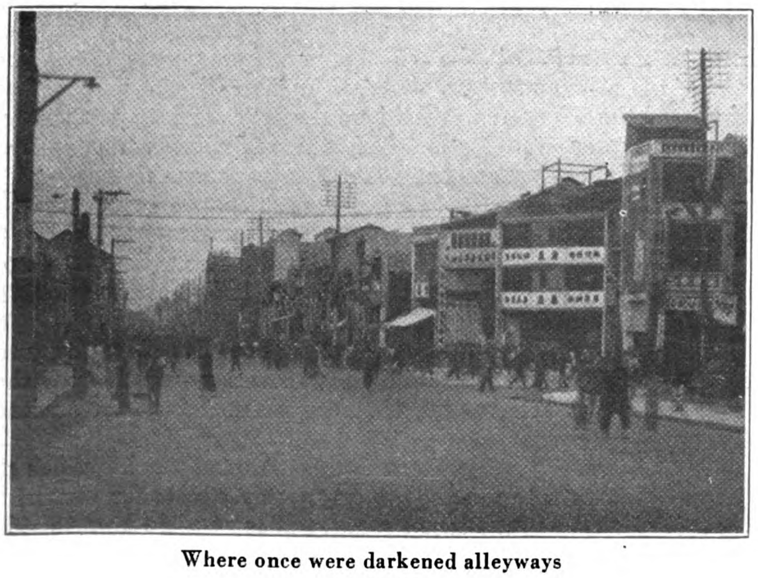
Turning now to buildings, the latest development on the Canton waterfront is the nine-story building of the Tai Sun Company. Besides a full-fledged department store in the American style, the company includes in its new home a modern hotel and roof-garden called "Hotel Asia," which caters to foreign as well as Chinese patrons. The building is of concrete and cost $700,000, Hongkong currency. From the tower wonderful views of both the city and the harbor of Canton are to be had.

The building to the left of the Great Sun Company—that with the egg-shaped dome on the clock-tower—is the custom house of the port of Canton, where exports of about $52,000,000 gold and imports of $30,000,000 are handled annually. Canton was until 1842 the only point of contact between China and the West.

This modern waterfront of Canton extends downstream from the foreign concession of Shameen for some two miles. There are several very striking and really substantial structures, but most of the buildings are a curious combination of Western and Chinese ideas and are not always as carefully built as they should be. This waterfront development is all on filled-in ground, and the whole of it, including the bund-wall itself, all the front buildings and most of the second row as well, has sprung up within the last 15 years.

And now there follows such general information as need not come under any particular heading all of which show in some detail the changes that are being wrought in Canton.

The American commission form of city government is being copied and enforced in Canton, Swatow and other cities of Kwang-



Where once were darkened alleyways

The ancient ricksha moves beside the modern telegraph wires

On the River front at Canton

tung. So far it has been successful, especially along the lines of public health, public education, public works and public utilities. Now physicians and druggists have to register, and all restaurants and food dealing places are subject to inspection by the health authorities. The motor bus and other cars cannot operate without a license and an experienced driver; and hotels, theatres and amusement places have to be morally clean.

Consciousness of their power has not only been felt by the women who have gained the privilege of equal education throughout the province and general suffrage in Canton proper, but also by the laboring class. Through a series of strikes and demands, the laborers in Canton at least have received higher wages for less work; and the municipality of Canton has provided three seats in its advisory council for the laborers with same privilege to merchants, while the teachers, the physicians, the engineers and the lawyers have each only one representative.

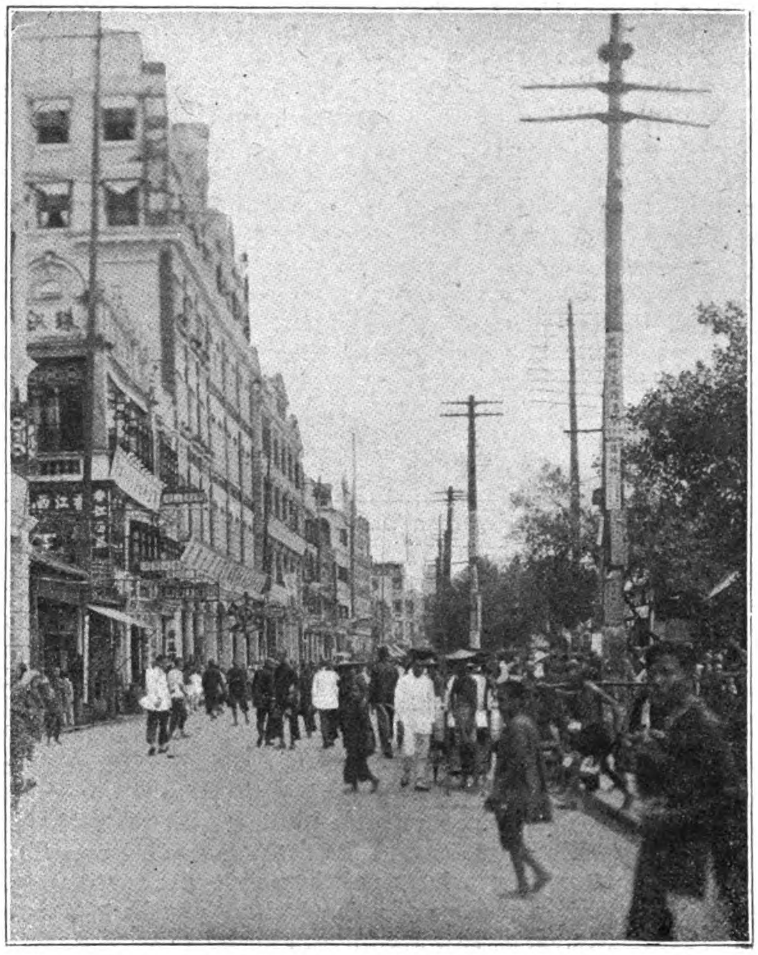
Canton city is laying out a track and field on the east parade ground for the athletes of the city, and the baseball players of the Sun Ting Club, composed mostly of returned students from America and Europe, will not have to practise their games daily in front of the "New World," an amusement park recently opened for men, women and children.

Political chaos in Kwangtung has not impeded the progress in industry in the last three years. Kwangtung now has matches for export, and the factories in Tungshan, Yimpo, Honam and Wongsha are providing employment for thousands of women and children. Rubber goods, the printing press, paper card boards are new industries in this province, while weaving, knitting, rattanware manufacturing continue to show growth. Cantonese now has factories that turn out leather, and 1920 found the export of this product an increase of 15,000 piculs over the previous year. The building of modern roads in Canton city the last two years has forced the Government Cement Works in 1920 to produce some 130,000 casks, an increase of 50 per cent. on the working of the previous year.

The last year or two saw the formation of stronger fire-insurance companies under native management, and the fear of local disturbance in important cities due to the civil war did not discourage the operation of many agencies. The Chinese Merchants Bank of Hongkong and the Provincial Bank of Kwangtung opened offices in Canton last year, in addition to the Bank of China and the Bank of Canton, making now four Chinese modern banking institutions operating here. The patrons and depositors of these banks are growing rapidly. The Cantonese have just organized a stock exchange. The general chamber of commerce has organized a department of statistics and will issue trade reports from time to time. The government will grant a lot to this body to erect a modern building for offices. The merchants along the Bund in Canton have ordered modern fire-fighting apparatus, and it will not be long when engines of the latest type will replace the ancient system of water-wheel and buckets.

For the best part of the last three years the grounds of the Canton government agricultual experiment station were occupied by the militarists as a government office compound and the farming experts had to labor in matsheds outside of their old laboratories and testing rooms; but in spite of these obstacles and lack of financial support, many farmers have been taught to raise more than two rice crops a year and plant useful food-stuffs between seasons. The department of forestry which will supervise the reafforestation of many barren hills of Kwangtung has commenced service in some North River districts, while the board of conservancy works has built many dykes along the East River to guard the interests of local shipping and agriculture. In addition to government efforts the Canton Christian College has opened a course in sericulture, and in addition to instruction to regular students, silk farmers will be invited annually to the college farm to hear lectures and watch demonstrations which will improve their knowledge on this line.

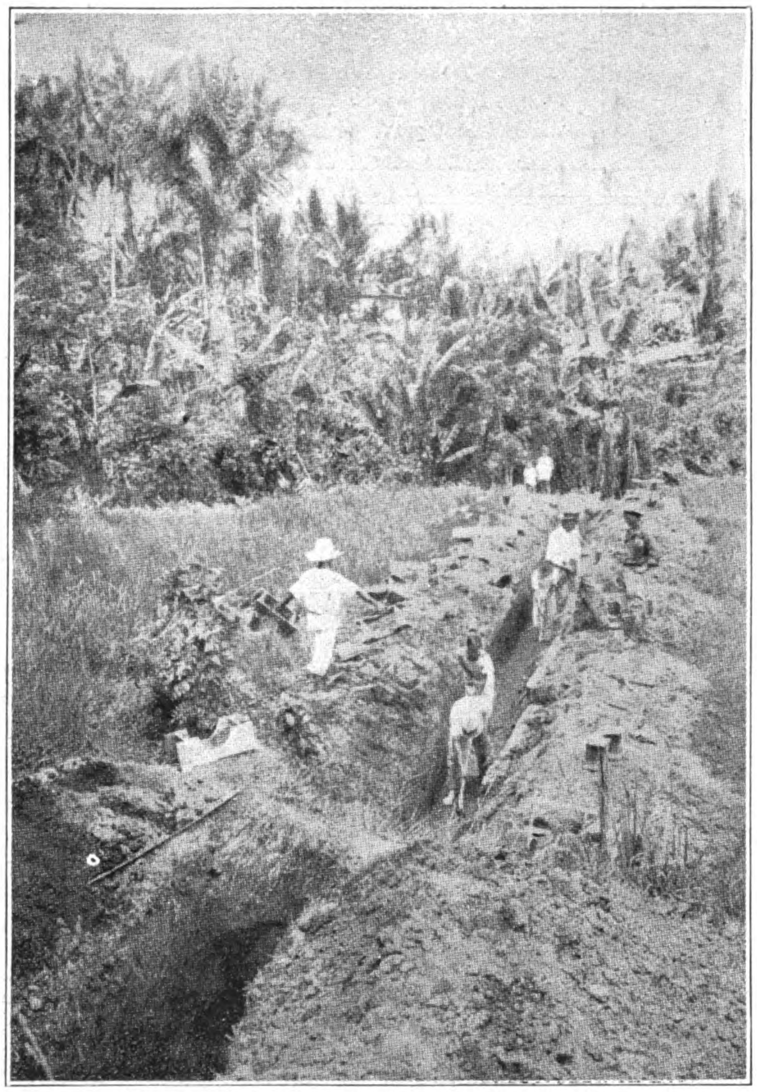
These few details are perhaps sufficient to show that much is being done in Canton along Western lines and in the course of time, it may not be very far off now, we may see a city which, except for its signboards, people and such other inevitable evidences of China, will have the material appearance of a modern American or European city.



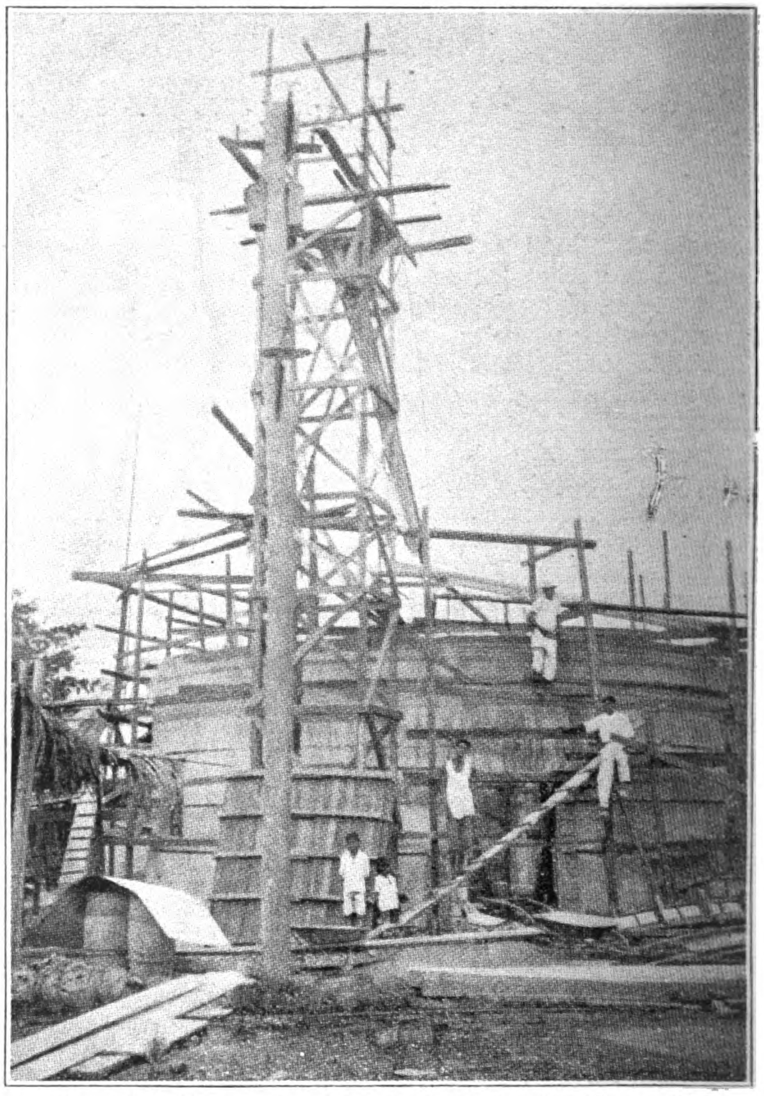
An Imposing Array of Buildings, Canton

Philippine Water Supply Systems

AMERICAN rule has brought many benefits and blessings to the Philippines. It is safe to say, however, that the much advertised political progress of the islands is not to be compared to other improvements touching more intimately upon the life and health of the people, the most important of which has been the gift of pure drinking water through the sinking of countless artesian wells. In the past, many of the cholera epidemics which periodically swept the islands and took heavy toll in human lives, had their origin in a germ-laden water supply. Probably the most severe visitation of this terrible scourge had its origin in a broken drain pipe which discharged the filth of the Tondo district into Manila Bay. One day, a native wandering along the black sands at low tide, was amazed to see a spring bubbling up through the ooze and mud, and lifting some of it to his lips, lo! and behold! it was fresh. Miracle! Miracle! he shouted, and ran and told his friends. Soon from all over the district the natives swarmed down to the beach to bear away in bottles and other receptacles the precious, miraculous fluid. And then the grim reaper began his harvest, and still the natives came to the shore at low tide for more of the wonderful water and the death list rolled up. The epidemic spread to the provinces and thousands were swept away. In tracing the origin of the epidemic, the health authorities were told of the miraculous spring, which, upon investigation, proved to be the sewage water oozing and bubbling up from a bursted drain pipe buried several feet below the sands. Such a thing could not happen again in the Philippines where the natives have been educated to take precautions against impure water, and to rely on the "village pump" or the artesian well supply.



Pipe line, Nagcarlan Waterworks, Laguna, P.I.



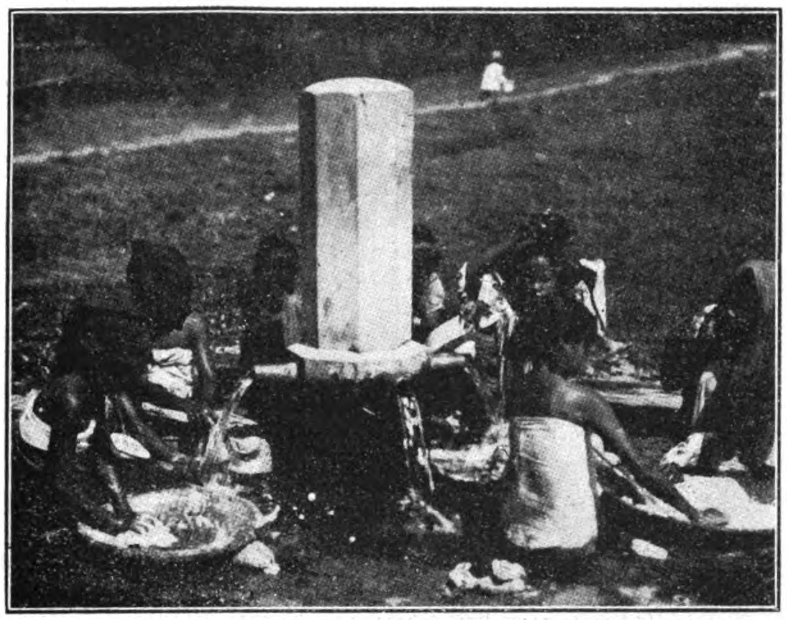
Santa Cruz Waterworks. Tank under construction, Laguna, P.I.

The vital statistics of the islands indicate the effect that this has had on the mortality.

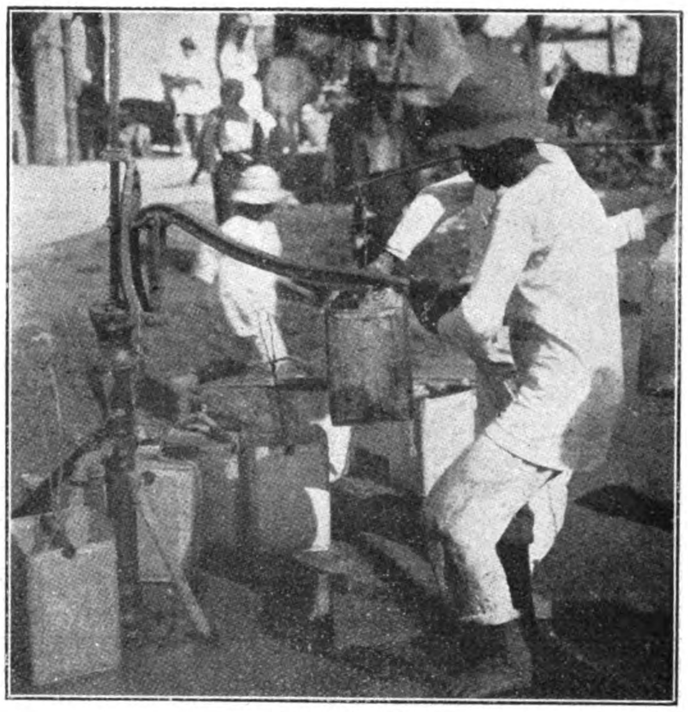
The latest census of December 31, 1918, gives a comparison of mortality in the Philippines in 1903 and 1918 and the figures give an idea of the sanitary conditions in certain localities of the islands, due to a great extent to the establishment of artesian wells. These figures, however, are rather high, due to the epidemic of influenza which wrought havoc during 1918. In 1903, with a total Christian population of 6,987,686, there were 442,048 deaths. In 1918, with a total Christian population of 9,495,272, there were 384,180 deaths.

It became more and more evident in the early days of American rule, that no great improvement in health conditions could be hoped for because of the contaminated water supply charged with amœbic and other intestinal germs, so only by recourse to a wide spread system of artesian wells could the public health be preserved.

The results obtained have been most gratifying. The attitude of the government toward the encouragement of artesian well



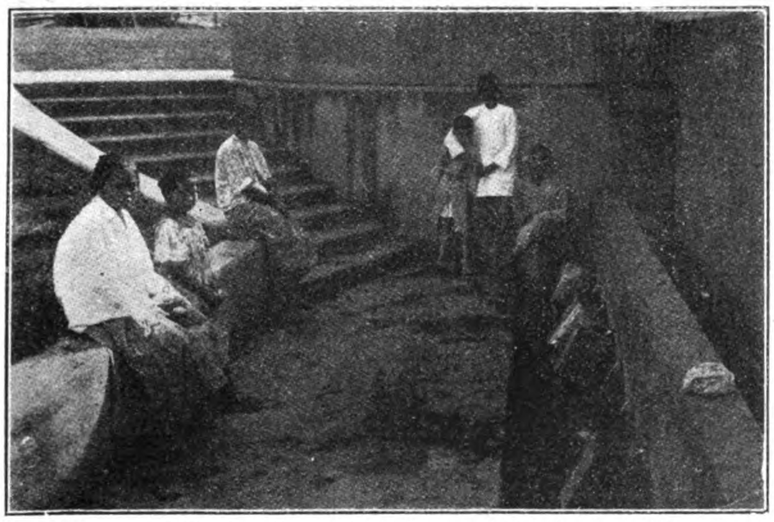
A Typical Town Pump in the Philippines



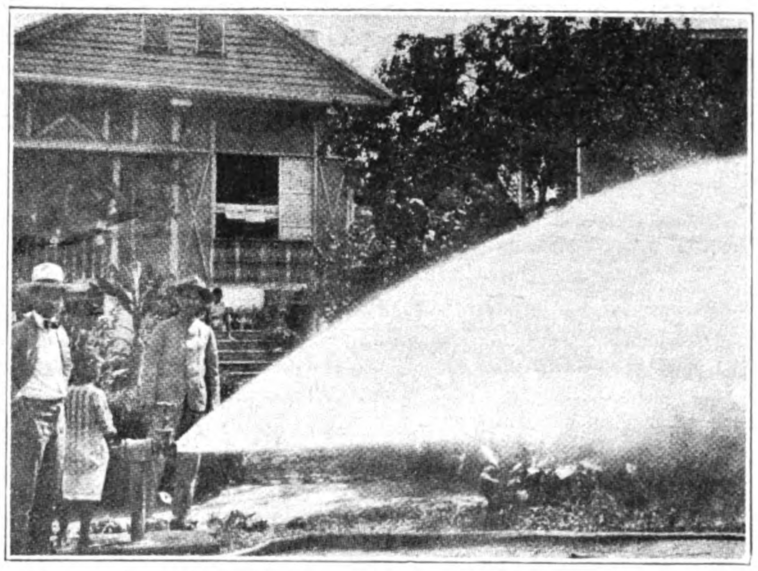
At the Village Fount

Where many may use Free Water

Type of Public Service Artesian Water System

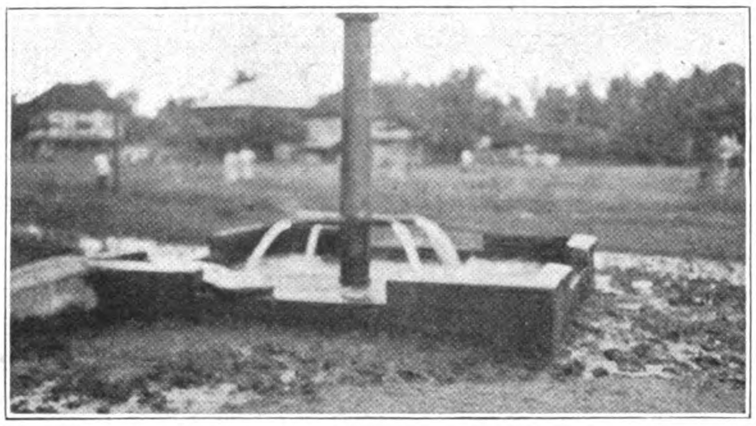


Large Public Artesian Well with Trough Equipment, Cebu



Fire Hydrant Opened. Pagsanjan Waterworks, Laguna Province

projects can best be shown by the money which has been appropriated to encourage this work and the results accomplished by the bureau of public works in the disbursement of this money. The Philippine legislation is constantly augmenting the appropriation for this purpose, and for the fiscal year 1919 voted $450,000 as against $200,000 for 1918. The appropriation for 1919, however, included the amount of $200,000 set aside for the purchase of drilling



An Artesian Well, 400 feet deep. Flow 220 gallons per minute.

machines, equipment and supplies. These materials were requisitioned through the purchasing agent at New York.

In 1914 it was estimated that 1,500,000 people, or more than one-sixth of the population of the islands at that time, were supplied with water from artesian wells. At present the number benefited by these wells is over four-tenths of the actual population, which, if based on the report ending December 31, 1918, would be over 4,000,000 people, the population being 10,350,640.

While the greater portion of these wells are drilled as public wells for the municipalities and provinces, a good many of them are private wells, belonging to sugar centrals and other private enterprises and individuals. In Manila individual wells have been drilled for the city of Manila, the bureau of science, Manila Railroad Company, general hospital, boys' reformatory, nautical school and manufacturing concerns, besides the various wells drilled for the insular public buildings.

During the year 1920, the activities of the waterworks section were confined largely to work on systems begun during 1918 and 1919. Considerable difficulty was experienced in procuring pipe and machinery, in some cases more than one year having elapsed between the time of placing the order and receiving the material.

Three new waterworks were started during the year and 33 systems on which work was commenced in 1918 and 1919 are being finished. To date, 76 systems have been completed in the islands. There are 76 new systems in 29 provinces proposed for construction which will be accomplished as rapidly as the legislature provides funds therefor.

Waterworks projects completed to date furnish potable water to a total population of about 250,000 and have cost approximately P.2,000,000 while projects under construction will supply a population of 110,000 at an estimated cost of P.1,732,673. The 76 proposed systems contemplate supplying potable water to about 320,000 people at an estimated cost of P.6,000,000.

The high prices charged in recent years for pipe, and the limited resources of the municipalities concerned have delayed the financing of large waterworks projects at Iloilo and several other towns for which data have been available. Act No. 2894 passed by the fifth Philippine legislature, authorizing provinces, municipalities, and chartered cities to issue bonds under certain conditions for public works projects should facilitate the financing of waterworks projects, but thus far, none of these branches of the government have availed themselves of this law. The Bangued project in Abra province and the Santa Cruz and Majayjay projects in Laguna were, however, partially financed by bond issues authorized by Acts Nos. 2338 and 2773 respectively.

The status of all waterworks projects to date is shown in the following lists:—

List (A).—New waterworks projects begun in 1920.

List (B).—List of waterworks projects under construction, exclusive of list (A).

List (C).—Waterworks projects completed.

List (D).—New waterworks projects.

LIST (A).—*Waterworks Projects begun in* 1920.

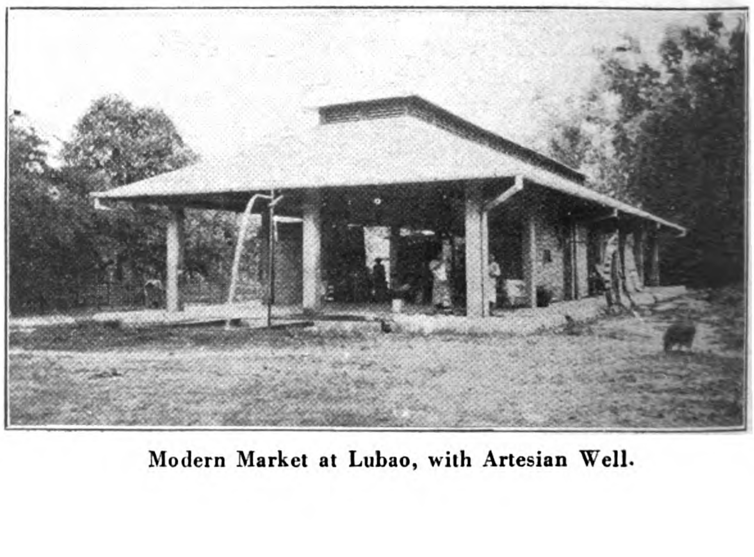
Province.	Municipality.	Population to be served.	Estimated cost. P.	Insular allotment. P.	Municipal allotment. P.	System.
Abra	Bangued	5,500	101,000	50,000	40,000	Gravity
Samar.......	Catbalogan ..	2,000	50,000	25,000	12,500	Do.
Tayabas	Mauban......	3,500	40,000	25,000	12,500	Pump
Total		11,000	191,000	100,000	65,000	

LIST (B).—*Waterworks Projects under Construction exclusive of List* (*A*).

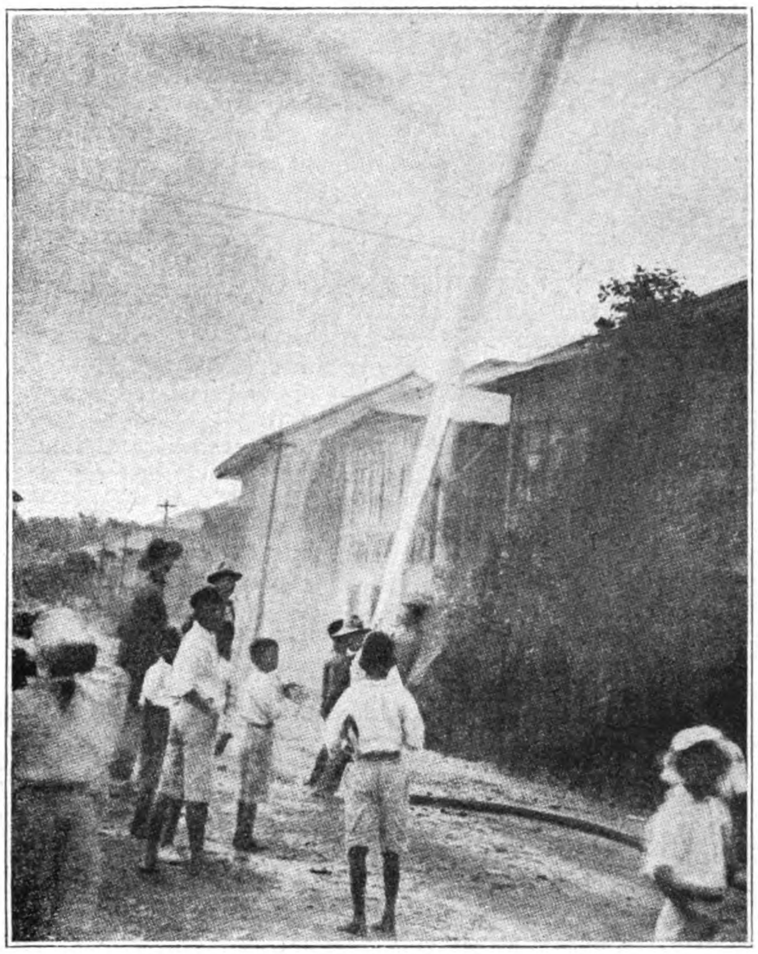
Province.	Municipality.	Type of system.	Population to be served.	Estimated cost. P.	Insular allotment. P.	Municipal allotment. P.
Antique ...	San Jose	Pumping	3,000	41,000	26,667.00	15,436.59
Batangas ..	Batangas	do.	6,147	72,125	43,600.00	27,768.68
Do.....	Lemery	do.	7,200	42,000	25,000.00	15,411.19
Do.....	Lipa.........	do.	5,000	90,000	50,000.00	30,000.00
Do.....	San Jose	Gravity	4,000	46,300	23,000.00	11,500.00
Bohol ...	Tubigon	Pumping	4,800	30,850	20,000.00	10,000.00
Bukidnon..	Malaybalay ..	Gravity	3,000	12,000	8,000.00	4,000.00
Cavite	Mendez-Nuñez	Pumping and hydro-electric	1,280	48,000	33,333.33	18,000.00
Cebu	Carcar	Gravity	6,400	55,000	36,400.00	18,200.00
Do.	Dalaguete extension ..	do.	1,333	50,000	5,000.00	2,500.00
Do.	Dumanjug ..	Pumping	1,500	30,000	20,000.00	10,000.00
Do.	Ginatilan ...	Gravity	1,600	13,800	9,000.00	4,800.00
Do.	Malabuyok ..	do.	1,200	15,000	10,000.00	5,000.00
Do.	Opon	Pumping	1,200	28,000	10,000.00	5,000.00
Do.	Poro	Gravity	800	9,000	6,000.00	3,000.00
Do.	Tudela.......	do.	800	9,000	6,000.00	3,000.00
Davao	Davao	do.	4,800	120,000	75,000.00	48,332.66
La Laguna	Santa Cruz ...	Pumping	6,000	70,000	46,667.00	23,333.00
Marinduque	Gasan	do.	1,400	20,000	13,333.33	6,500.00
Do.	Malbog	Gravity	1,000	15,000	10,000.00	5,000.00
Mindoro ..	Abra de Ilog..	Gravity	330	5,300	3,000.00	1,500.00
Misamis ...	Cagayan	Pumping	3,000	33,000	22,000.00	11,000.00
Mountain Province..	Apayao	do.	800	7,000	5,000.00	2,500.00
Do.	Baguio	Pumping and gravity	5,000	130,000	90,000.00	37,500.00
Do.	Cervantes	Gravity	800	4,000	2,667.00	1,350.00
Do.	Trinidad	do.	1,500	30,000	30,000.00	—
Oriental Negros. ..	Dumaguete...	Pumping	4,000	48,600	30 000.00	15,000.00
Pampanga	Arayat.......	Gravity	3,840	13,200	8,800.00	4,400.00
Sorsogon ..	Bacon	do.	3,200	21,000	14,000.00	7,000.00
Surigao....	Gigaquit	do.	2,500	7,500	5,000.00	2,500.00
Tayabas ..	Lucban	do.	3,200	45,000	25,000.00	15,000.00
Zambales .	San Antonio .	do.	4,000	71,000	25,000.00	24,000.00
Zamboanga	Zamboanga .	Gravity and hydro-electric	4,375	309,000	75,000.00	203,570.00
Total............................			99,025	1,541,673	812,467.66	592,102.80

LIST (C).—*Waterworks Projects Completed.*

Province.	Municipality.	Population.	Cost.	System.	Remarks.
Albay	U.S. Reservation Regan Barracks	(*b*)	P.	Steam pumping	
Batangas	Balayan	2,000	7,333.92	Gravity	
Do.	Cuenca	2,500	5,000.00	do.	
Do.	Taal	5,000	89,507.17	Pumping	
Bohol	Davis	840	5,100.00	Gravity	
Do.	Duero	2,000	10,431.71	do.	
Do.	Jagna (*a*)	2,400	20,042.73	do.	
Do.	Loay	2,400	15,308.85	do.	
Do.	Tagbilaran	5,245	12,990.35	Pumping	
Bukidnon......	Denric	600	—	Gravity	
Do.	San Luis	500	650.00	do.	



Modern Market at Lubao, with Artesian Well.



Testing Pagsanjan Waterworks System, to 140 pounds pressure, Laguna Province

Province.	Municipality.	Population.	Cost.	System.	Remarks.
Bulacan	Hagonoy (a)	690	6,503.22	do.	
Capiz	Capiz	7,000	12,000.00	Gravity, circular concrete tank	Originally 1864, reconstructed 1900, by military government.
Do.	Romblon.........	2,300	—	Gravity	
Cebu	Barili	4,000	26,000.00	do.	
Do.	Catmon (a)	1,800	15,357.40	do.	
Do.	Cebu	40,000	437,757.77	do.	
Do.	Moalboal	3,000	15,000.00	do.	
Do.	Pilar (a)	1,000	9,000.00	do.	
Do.	Poro	800	9,000.00	do.	
Do.	Naga extension ...	2,000	4,500.14	do.	
Do.	Samboan.........	1,600	4,981.02	do.	
Do.	San Francisco ..	1,400	6,200.00	do.	
Do.	Sibonga	6,000	32,300.00	do.	
Do.	Tudela..........	800	8,659.90	do.	
Cotabato	Parang	600	9,600.00	Hydraulic ram	
Ilocos sur	Vigan	6,440	137,242.58	Gravity	
Isabela	Ilagan, tank construction	—	—		
Laguna.... ..	Bay	1,471	2,797.21	do.	
Do.	San Pablo	7,000	85,550.75	do.	
Do.	Majayjay	3,200	37,179.05	do.	
Do.	Nagcarlang	2,500	32,858.33	do.	
Do.	Pagsanjan........	4,044	73,782.67	Pumping	
Marinduque ..	Boac	1,000	6,653.00	do.	
Do.	Mogpog	1,280	10,535.69	Gravity	
Do.	Santa Cruz	2,560	20,696.23	do.	
Mindoro	Calapan..........	2,500	29,936.76	Pumpin	
Misamis	Baciregasay	3,284	3,500.00	Gravity	
Do.	Mahinog	5,727	6,000.00	do.	
Do.	Mambajao	14,446	30,000.00	do.	
Do.	Sagay	6,321	800.00	do.	
Mountain Province	Teachers' Camp and country club	500	(d)	do.	
Mountain Province	Mansion House ..	100	(d)	Pumping	
Oriental Negros	Siquijor Poblacion	1,587	18,000.00	Gravity	
Do. ..	Barrio Siquijor ..	497	—	do.	
Do. ..	Luzurriaga	2,500	12,326.39	do.	
Do. ..	Talinting	2,890	5,025.00	do.	
Do. ..	Basac	265	—	Hydraulic ram	
Do. ..	Maria............	1,121	—	Gravity	
Do. ..	Lasi	2,300	6,980.77	do.	
Palawan	Puerto Princesa ..	1,600	25,000.00	Pumping	
Do.	Coron	1,000	4,800.00	do.	
Pampanga	Angeles	6,708	2,600.00	Steam pumping	
Do.	San Fernando	100	(c)	Pumping	
Pangasinan	Bayambang	1,500	3,280.62	Gravity	
Do.	Dagupan	(c)	2,823.02	do.	
Do.	Lingayen	(c)	3,938.99	do.	
Do.	Lingayen	(c)	9,141.22	do.	
Do.	Mangaldan	(c)	635.53	do.	
Do.	San Fabian	(c)	682.87	do.	
Do.	Bani	2,000	12,022.27	do.	
Rizal..........	Antipolo	2,250	23,299.07	Pumping	
Do.	Pasig	10,000	40,000.00	do.	
Samar	Oras	4,000	—	Gravity	Constructed by military
Sorsogon	Magallanes	3,500	8,000.00	Pumping and gravity	
Do.	Sorsogon	250	1,044.67	Pumping	Municipal building
Sulu	Jolo	722	76,905.29	do.	
Surigao........	Bacuag	3,944	7,500.00		
Do.	Lianga	2,032	1,924.58	Gravity	
Do.	Placer (a)	1,200	13,436.17	do.	
Tayabas	Lucena (a)	7,500	234,390.57	do.	
Do.	Tayabas (a)	4,600	125,159.36	do.	
Do.	Sariaya	6,000	37,935.00	do.	
Zambales	Subic	1,628	12,400.00		

List (D).—*New Waterworks Projected.*

Province.	Municipality.	Estimated Cost. P.	Population.	System.
Albay	Guinobatan	—	12,300	No data
Do.	Albay and Legaspi	60,000.00	11,000	Pumping
Do.	Viga	15,000.00	3,316	
Batanes	Ivana	40,000.00	2,000	Gravity
Do.	Sabtang	—	748	No data
Batangas	Balayan extension	1,500.00	—	Gravity from Balayan tank
Do.	Rosario	30,000.00	7,000	Pumping
Do.	Santo Tomas	28,000.00	1,310	
Do.	Taal extension to Sambat and Buli	18,000.00	2,105	Gravity from Taal tank
Bohol	Antequera	9,000.00	2,600	
Do.	Carmen	6,100.00	600	Gravity
Do.	Corella	6,000.00	1,019	
Do.	Garcia-Hernandez	37,500.00	2,000	Do.
Do.	Loon	30,000.00	4,000	Do.
Do.	Mabini	6,000.00	—	Do.
Bulacan	San Miguel	50,000.00	2,308	
Cagayan	Aparri	100,000.00	3,284	
Do.	Lal-lo	15,000.00	996	
Cavite	Cavite	200,000.00	8,298	
Do.	Indang	42,000.00	2,000	Pumping
Do.	Silang	62,000.00	3,200	Gravity
Cebu	Alegria	38,000.00	660	
Do.	Asturias	92,000.00	1,086	
Do.	Argao	—	2,000	Pumping
Do.	Balamban	40,000.00	2,113	
Do.	Pilar	6,000.00	800	Gravity
Do.	San Fernando	30,000.00	2,398	
Do.	Talisay	30,000.00	2,000	Gravity
Do.	Tuburan	68,000.00	9,146	Pumping
Cotabato	Cotabato	62,000.00	1,250	Ram and gravity
Ilocos Norte ..	Laoag	150,000.00	25,000	Gravity
Iloilo..........	Iloilo	2,500,000.00	51,000	Gravity
Do.	Pototan..............	295,000.00	5,672	Do.
Laguna........	Alaminos	12,000.00	1,127	Pumping
Do.	Calamba	30,000.00	3,463	Not decided
Do.	Magdalena	45,000.00	1,811	Gravity from Majayjay
Lanao	Dansalan	—	2,000	Hydro-electric
Leyte	Baybay	15,000.00	6,000	Pumping
Do.	Burawen	—	3,038	Gravity
Do.	Liloan	7,500.00	792	
Do.	Maasin	10,000.00	4,167	
Manila	San Lazaro Hospital ..	45,000.00	2,000	
Do.	School of arts and trades	27,000.00	800	
Misamis	Misamis..............	66,000.00	1,564	
Mountain Province	Kabuyao	—	800	Do.
Do.	Lubuagan	21,000.00	800	Gravity
Marinduque ..	Torrijos	23,000.00	1,075	
Nueva Ecija ..	Cabanatuan	102,000.00	4,800	
Palawan	Bacuit	3,100.00	1,000	Do.
Do.	Bintuan	4,500.00	1,000	Do.
Do.	Cagayancillo..........	—	1,066	Rain water tank
Do.	Concepcion	3,600.00	600	Gravity
Do.	Cuyo	4,500.00	800	Pumping
Pangasinan	Dagupan	—	4,436	No data
Do.	Malasiqui	30,000.00	2,613	
Do.	San Manuel	24,000.00	3,500	Pumping
Romblon	Looc	30,000.00	1,000	
Samar	Calbayog	20,000.00	5,907	
Sorsogon	Barcelona	22,000.00	2,285	
Do.	Sorsogon	—	1,396	No data
Surigao........	Surigao	45,000.00	7,959	

NOTE.—For reference of (a) and (d) see footnotes at bottom of p. 44.

(a) Completed, 1920. (b) Variable. (c) Market or School. (d) Not available. (e) Unknown.

Artesian Well at Santa Maria, Bulacan, with flow of 200 gallons per minute

Regulations for Purchasing Chinese Railway Materials

THE Chinese government railway department purchases annually supplies of all kinds to the value of $20,000,000, the orders for which in the past have been placed by the managing directors of the various lines without reference to the ministry of communications. The difficulty in centralizing these purchases has arisen from the operation of loan terms and conditions which gave certain preferential rights to purchasing agents, a condition, which still exists, but is more or less ignored by the authorities in their desire to reduce expenses and concentrate the purchasing under one central bureau. This phase of the situation is dealt with in another article in this number of THE FAR EASTERN REVIEW. Under the direction of Minister Yeh Kung-cho a policy of efficiency and economy was introduced into the administration of the ministry of communications for the purpose, amongst other things, of purchasing materials, and the new minister, Mr. Chang Chih-tan, has authorized the drafting of a new set of regulations to govern the purchase of railway supplies in the future. The new director-general of railways, Dr. C. C. Wang, was also heartily in favor of some such scheme and prepared a memorandum which was approved by the minister and cabinet, and is now in force. It will be noted that public tenders, either limited or unlimited, are to be invited for all requirements exceeding $5,000 in value.

I. Specifications, Drawing and Samples of Materials

1. The term "materials" as employed in these regulations is applied to all materials and articles used on the railways and includes locomotive, passenger and freight cars, track materials, machineries and tools.

2. In connection with every purchase of materials by the railways, complete specifications and drawings or proper samples must be previously prepared, to be used as standards of the materials purchased.

When materials are received, their acceptance or rejection will be made, after inspection, in accordance with the requirements of the specifications, drawings or the samples.

3. Sufficient copies of specifications and drawings must be prepared to be given to those who desire to submit tenders for supplying the materials. When samples are furnished one or several of them are to be placed at a definite place for examination only by the suppliers if no more can be provided.

4. Chinese, English or French language may be used in the specifications and drawings. If the original is in English or French while the materials can be purchased in China, a translation in Chinese is to be attached. If the original is in Chinese while the materials have to be purchased abroad, attached translation in English or French is to be made.

II. Invitation of Tenders

6. Whenever any single purchase of the same material of several similar materials is estimated to be over $5,000, Chinese currency, an invitation of tenders is to be made. Special conditions under railway loan agreement are to be excepted.

7. When a material is produced solely by one manufacture and the exclusive agency for selling the material is held by one concern, and if the material cannot be substituted for by any other material, no invitation of tender is needed. If the agency is not exclusive, an invitation must be made to the several agents to submit their tenders under conditions same as those mentioned in Article 6.

If any supplier has made a long term agreement with any railway to furnish a certain material or number of materials even when that supplier holds no exclusive right otherwise of selling that material or those materials, no invitation of tenders is to be made. But the railways concerned are to report such agreements to the ministry within one month after the promulgation of these regulations.

When the railways desire to have these agreements renewed after their expiration they must ask for the approval of the ministry by stating the reasons for their renewal.

8. Invitation of tenders may be either limited or unlimited.

9. A limited invitation of tenders is made when the railways invite by correspondence only those reputable and reliable firms or manufactures to submit their tenders. For each invitation of this kind, three competitors at least must be selected for the purpose. Those who have never supplied materials to the railways before and the newly established firms or manufacturers may also be invited to submit tenders when they are found by the railways to be capable of supplying the materials needed or when they are willing to make proper deposits with the railways to insure their good faith.

10. Unlimited invitation of tenders shall be made by the railways through advertisement in the well-known newspapers at suitable localities and is open to all who are interested.

11. In limiting the period for submitting tenders, sufficient time must be allowed for the firms to carefully study the specifications, drawings or samples and to make their estimates. When the materials have to be purchased abroad, further allowance must be made for the firms to mail the specifications and drawings and to secure their quotations or any other information by cabling.

III. Deposits

12. When the invitation of tenders is unlimited, those who wish to submit tenders are required to make each a deposit with the railways in addition to the payment for the cost of specifications and drawings.

13. The amount of the above-mentioned deposit shall be fixed by the railways according to circumstances.

14. The deposits will be returned to the bidders after the selection of tender has been made except the one whose tender has been selected and whose deposit may be transferred to the deposit for the contract.

In case the supplier whose tender has been selected announces his inability to supply the materials or fails to call at the railway offices for the signing of the contract within the stated period after the announcement of the selection of tender, his deposit made at the time of submitting the tenders is forfeited and also his right to supply the materials will be annuled.

15. The supplier when tender has been selected shall at the time of signing the contract, make a deposit with the railways.

16. The amount of this deposit for the contract shall be fixed by the railways according to circumstances and shall be clearly stated in the specifications.

17. The deposit for a tender or a contract shall be either in form of cash or acceptible bonds or a letter of guaranty covering the sum of cash required from any bank accepted by the ministry of communications.

IV. Supervision over Tenders

18. Whenever the estimated cost of the same material or several similar materials to be purchased exceeds $5,000, Chinese currency, the railways shall report to the ministry : (*a*) the kinds of materials to be purchased with specifications drawings or samples accompanying the report ; (*b*) the amount and estimated cost of each material to be purchased ; and (*c*) the way in which tenders are going to be invited (limited or unlimited), the date fixed for opening the tenders and the amounts of deposits required for tenders and contracts. When the invitation of tenders is limited the names of the firms or manufacturers to be invited shall also be stated. Only after due approval by the ministry the railways can issue invitation of tenders either by correspondence or through advertisement in newspapers.

19. The letters or advertisement for inviting tenders shall contain these words "with the approval of the ministry of com-

munications," this invitation is made to the suppliers to submit their tenders.

20. Irrespective of whether the invitation is limited or unlimited, all tenders submitted shall be opened on the prefixed date at the specified hour.

21. Whenever the estimated cost of the materials exceeds $50,000 a delegate or delegates from the ministry of communications must be invited to be present at the time of opening the tenders.

22. The result of the opening of tenders must be reported to the ministry and, before the signing of the contract, the tender selected and the drafted contract shall be sent to the ministry for approval.

23. When several bidders and the manufacturers whom they represent are equally known and also when their terms of delivery and payment, etc., and about the same, the one whose bid is the lowest shall be selected to supply the materials.

24. Before the opening of tenders, or after the opening but before the signing of the contract, whenever it is descovered that the bidders have raised the prices through general agreement or attempted in any other way to hold up the government, the railways shall report to the ministry of communications to have the tenders submitted by those bidders made disqualified and the materials purchased in any other way deemed adversable under the circumstances.

25. All purchases of materials by the railways not in accordance with Articles 6, 18, 20, 21, 22 of these regulations are hereby disapproved and shall not be recognized except in case of *force majeure* when special approval can be requested for.

V. Supplementary

26. Amendments to those regulations shall be proposed by the ministry of communications and become effective after they have been passed at a cabinet meeting.

27. All the above regulations shall be effective from the date of promulgation.

Bang! Goes Another Door

THE *Chicago Daily News*, of September 1, publishes what purports to be an amazing contract between a Chicagoan and the Chinese republic, and in view of criticisms arising out of the Cassell Coal Mining Concession with the former military government of Canton and the opposition of the present southern cabinet towards its ratification, the following information is extremely interesting, significant and important, *if true*. And, if the story should be true, we may as well forget about the "Open Door." As Dr. Ma Soo, the delegate of the Canton government in Washington, has not officially denied the story of the contract, it is now up to Canton to declare itself. The Chicago paper says:

"George H. Shank, who occupies offices in the Stock Exchange building, becomes a partner with the 'Government of China' in twenty-year industrial development operations. He is given a practical monopoly of business concessions in the whole yellow republic. He undertakes to interest American business in China on an unprecedented scale. The government headed by Dr. Sun Yat-sen, at present known as the 'Government of South China,' which aspires to the conquest of the whole country and which has already overrun more than half of it, agrees, according to a contract he holds, to pay Shank one-third of the net profits of all industries organized and promoted through his efforts, as well as 25 per cent. on the purchase price of all material that may be bought from the United States government.

"The South China government pledges itself to issue a preliminary bond flotation of $100,000,000 gold, 8 per cent. interest, to be used in the promotion of industrial development. If conditions warrant, other bonds will be issued. Their marketing will be left entirely to Mr. Shank. He will offer the bonds to American firms interested in China's development.

"Mr. Shank some time ago gained fame when he presided over the consular court at Shanghai.

"The first $100,000 worth of bonds has been used up long ago, says Mr. Shank, and $190,000,000 more promised to eager investors. The total issues of the South China government may amount to $3,000,000,000 or $4,000,000,000, he declares. Eighty-five large American corporations are said to have been interested, among them banks, railroads, construction firms, electrical houses, coal companies, etc. Contracts have been let, he says, for the building of many miles of roads and the entire reform of China's electricity system is planned.

"The government, which has signed this amazing contract, has been recognized by no foreign government. Springing from a revolution in 1917, it first proceeded to establish order in the province of Kwangtung (Canton) and from there to radiate out over the south of China. Late dispatches indicate that its troops have crossed the Yangtze-Kiang and are driving the Peking forces to the northward. It claims to have a popular mandate from a Chinese parliament sitting at Canton."

It would be interesting to learn the names of the eighty-five large American corporations alleged to be associated in this deal, and what steps, if any, the American government has taken to inform them of the risks they are running. Looking at the story dispassionately, it would seem that after all the chances of Mr. Shank and his syndicate to get their money back are almost as good as those of other Chicago financiers who have loaned money to Peking, for, unless Peking can squash Canton (a highly improbable termination to China's troubles), some compromise will be necessary, in which debts incurred by the South will be recognized and incorporated in any general reorganization loan. If, on the other hand, President Sun ousts President Hsu, the Shank syndicate will have to be recognized and, perhaps, added to the American group in the consortium. It looks like an even gamble after all. Any further speculation will only lead to a headache.

A Book Review

TRAVELS OF A CONSULAR OFFICER IN NORTH-WEST CHINA. By Eric Teichnan, C.I.E. Published by the *Cambridge University Press*. Price 25s. net.

It is not improbable that the reading of this book by anybody other than one who contemplates going over the same trails and by-ways will prove to be somewhat of an effort. The general reader will be led over roads, through towns, across frozen streams, at certain times on certain days; he will be awakened at early hours of the morning to start on a day's travel which is to be but slightly dissimilar to that indulged in on the previous day and which has been planned after due disregard for supposed obstacles which Chinese officialdom declares to exist; so that all in all, his day in and day out are so much of a sameness that as time goes on the journeys become a trifle monotonous. He wishes perhaps that some alarming adventure would make a break in the steady progress, the precise and uneventful journey. If only a pheasant shoot, taking ten pages of graphic English to describe, were indulged in on the way, something to lend color, a little personal enjoyment, if not from the æsthetic point of view at least in the daily contact with the native whose sense of humour everywhere in this vast country is such as to enliven whenever contact that is not inhuman is made. If the general reader is content only to note the type of pony that is used in the land over which he is lead in travel, the topography of this land, and the distances between each point of travel, then he will endure the journeys and will derive much benefit in the way of really authoritative information. He will also part from the author the gainer in a vaster knowledge of China, especially of a territory so little known to foreigners, and he will, above all, be accurate in such information as will be of great help to future travelers over the same regions. A mind intent upon imparting correct information is, as a rule, steeled against impressionistic deviations, particularly if a not too bulky volume is its goal, so that while much has been lost to the romanticist, the gain to the realist has been great.

Apart from some discussion in regard to China's administration of interior places and an expression of views as to "the need for reform in the type of Christianity now being propagated amongst the Chinese," views which are unquestionably those held by a large number of non-missionary sojourners in these parts, some of whom, no doubt, decry even the presence of Christians other than school teachers and doctors in a country where other religions seem to fulfil, very admirably, the correct usages and requirements of any relegion, there is little in the book except accurate and somewhat tedious travel as we have already implied. But this in itself is so important in a land where correct knowledge of interior places is quite inadequate, that considerable credit is due to the author for the faithful record he has presented of his travels. It is a fine contribution to the meagre store of information on China's hinterland and as such is deserving of commendation.

C. L.

FAR EASTERN IRON AND STEEL

YAWATA IRONWORKS.—The Yawata Ironworks has been approached by the Osaka iron merchants' guild with a demand for the increase of the rate of discount. The ironworks have now announced its decision to give a discount of Y.1.50 per ton to contracts for 200 tons of rails, channels, etc., Y.2.50 for 400 tons, Y.4 for 700 tons, and Y.6 for 1,000 tons. With regard to other brands, agreements for 200 tons will receive a discount of Y.3, 400 tons Y.5, 700 tons Y.8, and 1,000 tons Y.12. With the present increase, production, it is said, will result in a loss of Y.15 per ton.

* * *

IRON INDUSTRY ENCOURAGEMENT ACT.—A statement appearing in the Japanese *Official Gazette* of the recently enacted iron industry encouragement act and amendments thereto has been forwarded by Trade Commissioner H. A. Butts. It was expected that this act would be made effective as of July 1 by an imperial ordinance, but it now appears there will be an indefinite delay. One provision of the act is that any person engaged in the iron industry with equipment to produce at a single place 5,250 metric tons or more yearly of pig iron or steel may be exempt from taxes on his industry and from income taxes on the profits yielded in the year in which the industry is started and for the following 10 years. The 5,250 metric tons mentioned shall mean 2,500 metric tons in the low phosphorus pig-iron industry.—*Commerce Reports.*

* * *

FAR EASTERN STEEL BUSINESS WITH AMERICA.—Japanese buying continues on a slightly smaller scale. Orders for copper are still being placed in the United States, one New York exporter having booked an order during the past week for 200 tons of electrolytic copper to a Japanese buyer.

The South Manchurian Railroad continues to buy lightly and an inquiry is being handled by one Japanese export house for about five miles of 60-pound rails and five miles of 75-pound rails. An inquiry is in the hands of the American subsidiary of a French interest, calling for about forty passengers cars for a Chinese railroad.

The Bombay water supply pipe line bids show a great divergence. It is understood that one American bid for the pipe line, fabricated and set in place, was somewhat over $11,000,000, while the bid of Braithwaite & Co., West Bromwich, England, was something over $5,000,000.

This low bid was for rivited pipe, while the American bid was for the lock bar construction. Allowing in the case of the English bid some $2,000,000, which it is estimated will be less than the cost of laying the pipe, there is left over $3,000,000 for the material fabricated delivered.

As there are about 80,000 net tons of material involved, it would appear that the unit cost of the fabricated steel pipe is about 2 cents a pound delivered. These figures are as yet unofficial. It may be added that the work will take two and a half to three years for completion.

Japanese buyers continue to place small orders in the United States, but considerable purchasing of German material is reported, the Japanese claiming that the quality and workmanship are improving. Sheet buying continues, but although the total of recent purchases by Japan in the United States is fairly large, virtually all purchases have been of black sheets, Nos. 28 to 31 gauge, the heavier sheets being placed with British makers, which are not in a position to quote as advantageously on the lighter gauges as the American mills. Low prices are insisted upon by Japanese buyers.

One exporter in New York, who recently quoted a price to Japan, based on $43 per ton, Pittsburgh, for a tonnage of 35-lb. rails, including splice bars, bolts and plates, was informed that a quotation about fifteen per cent. lower had been received. A bid of 1.65c per lb. Pittsburgh, on an inquiry for 800 tons of bars to be rolled to specifications was also turned down by a Japanese buyer, who stated that the price was too high.

An inquiry is now in the market from Japan for about 430 tons of structural steel for a bridge which will probably be awarded some time ago. One Japanese exporter recently booked an order for about 630 tons of 80-lb. rails for the South Manchuria Railroad.

* * *

COST OF IRON AND STEEL PRODUCTION IN CHINA.—The next group of items of cost is manufacturing expense. This comprises power, light, water, supplies and stores, replacement of tools, repairs and maintenance, new minor works, transportation in the works, laboratory expenses, depreciation and royalty. Steam power is supplied by boilers belonging to the department. Electric power, which is also used in the smelting plant, as well as light and water, is supplied by the mechanical department of the same works. Heat, an ordinary factor of cost, is unnecessary for those working at the furnaces, and for the office rooms and repair shops it is charged to "general expenses" or "repairs and maintenance." "Supplies and stores" includes all materials requisitioned for use of the furnaces or the blowing or pumping plants, except those that are in the nature of tools, which come under "replacement of tools." Yet, in actual practice, it is found that the line of demarcation is very hard to draw between the two, and consequently the latter heading has been abolished.

A similar difficulty is experienced in making a distinction between " repairs and maintenance " and " new minor works." The problem is only solved by arbitrarily assigning all works involving a cost of more than $500 to the latter, and those of less than that value to the former as maintenance. Of course very large capital outlays are entered in the capital accounts, and are charged off to the cost of production as depreciation. The transportation expenses are confined to the transportation of pig iron in the works, as charges for transporting raw materials and supplies and stores have already been taken account of under these two headings. The laboratory expenses are charges of the laboratory department for testing pig iron, etc., for the blast furnace department.

Provision for depreciation is always a difficult question, as different plans have different advantages. But where a plant has been working for many years without a proper system of accounting—as is the case with the Hanyang Works, where even the original cost of constructing the plant is more or less forgotten it becomes ten times harder to provide for depreciation. To make the best of the situation, a blanket charge of 5 per cent. on the value of the plant is written off every year as depreciation, and the basis of calculation is taken from physical valuation. The whole work has been valued more than once, but the most detailed estimates were made in 1909 by two foreign engineers engaged by the Hanyehping Company. The figures for blast furnaces are as follows :

	Tls.
Furnaces Nos. 1 and 2 (including blowing and pumping plants and boilers) ...	1,200,000
Furnace No. 3 ...	1,400,000
Elevated railway for conveying ore and coke to the furnaces ...	200,000
	Tls. 2,800,000
	or $ 4,200,000

Five per cent. on this sum means $210,000 a year or $17,500 a month.

The last item in this group is royalty. As early as 1897, it was agreed between the government and the works that, in consideration of the government shares and advances previously made to the works, the latter should pay as royalty one tael for every ton of pig iron produced. This item of cost, therefore, varies directly in proportion to the quantity of production. The percentage of all manufacturing expenses combined ranged in 1919 between 59 and 13.2. This, too, is very low compared with corresponding items for iron production in foreign countries.

The general expenses include both the overhead charges of the blast furnace department and those of the whole works. These two expenses form the last two groups of cost items in pig-iron production. The former varies from 3.9 per cent. to 6.2 per cent. of the total cost, and the latter from 4.5 per cent. to 7.7 per cent. The " financial " expenses consist of only one item, the interest on capital outlay. Much as has been said against the inclusion of interest in the cost of production, there is strong justification for its inclusion when the company controlling the production is heavily in debt, and its plant is virtually mortgaged to the creditors. The Hanyehping Company has borrowed heavily from Japan, and for such loans it must pay fixed interest charges. If these charges are not, in a sense, distributed over the products, the Company may be losing money when the selling prices of its products apparently include a wide margin of profit. The high percentage of this item, interest, compared with other cost items shows how easy it would be to reach such a paradoxical result.

Taking all cost items into consideration, we find that direct wages constitute the smallest percentage, and raw materials the largest. And the ratio between the two is as much as 1 to 90 (for March 1919). Such conditions cannot be found elsewhere. The percentages for manufacturing and general expense are not unusual, although they are lower than like percentages in other countries. The charge for interests is rather high, but this is due to the special conditions under which the plant is being worked. The following table is compiled from the cost data at the blast furnace department :—

Month	per ton	Materials	Labour	Manufacturing Expenses	General Expenses	Financial Expenses
1919	$	%	%	%	%	%
January ...	47.42	76.9	1.2	11.4	4.0	6.0
February ...	45.32	72.7	1.4	12.0	6.1	7.7
March	52.98	73.6	0.8	13.2	6.2	6.2
April	48.21	75.6	1.2	12.3	5.2	5.7
May	47.72	77.6	1.1	12.3	4.2	4.8
June	47.50	78.5	1.0	11.8	3.9	4.8
July	50.47	79.8	1.0	10.5	4.3	4.6
Average for 7 months ...	48.51	76.4	1.1	12.0	4.8	5.7

(*To be continued*).

Engineering, Financial, Industrial and Commercial News

AGRICULTURAL

Extensive Schemes Drawn up by General Chang.—General Chang Tso-ling, inspector-general of Manchuria provinces, is prepared to carry out the following schemes in connection with his grand plan for bringing Mongolia under cultivation :—

(1) To organize a gigantic reclamation and exploitation company by the central government with co-operation of local officials, in which Chinese and Mongols out of work will be employed.

(2) To exploit the agricultural land on basis of old Chinese system, viz., eight-ninths of the crop will be alloted to the planters to reward their labor while one-ninth to the officials as land tax.

Good Prospects of China's Wheat.—Though the harvest of the wheat crop of the whole world is not likely in general to be good this year, China's crop of wheat is reported to be good, especially in Manchuria. In 1896 the three eastern provinces yielded only 36,000,000-lb., but the output increased to 900,000,000-lb. ten years after. Judging from this, there is good reason to believe that China's wheat crop will stand first in the world some day.

AUTOS

A New Autobus Service.—The Honan provincial authorities have granted Mr. Pao Ping-shu, a Honan merchant residing in Hupeh, permission to form an automobile transportation company to run a motorbus service at Chow-kow, Lai-hu, Hsu-chang and Yih-chen.

Tientsin-Paoting Autobus Service.—Messrs. Chang Yu-shih, Chen Chung-ling, Wei Cho-nien and Wang Shu-kar, promoters of the Paoting-Kaoyang Automobile Transportation Company which was inaugurated on April 24, 1921, under the approval of General Tsao Kun, have suggested the sphere of their business be extended by running a motor service from Paoting to Tientsin, and the proposal has received favorable consideration by the civil and military governors of Chihli. The new company is to be capitalized at $100,000 in 500 shares of $200 each, and will have its head office at Tientsin with a branch at Paoting and stations at Zing-hai, Dah-cheng, Jen-chu and Kaoyang. Arrangements for purchasing land, constructing bridges and erecting warehouses are being carried on steadily.

Automobile Exhibition Planned for Calcutta, India.—It is learned through Trade Commissioner C. C. Batchelder that the Eastern India section of the Motor Trade Association will hold an exhibition in Calcutta during the coming winter, the exact date to be announced later. This will be the first exhibition of its kind in Calcutta since 1906. Only members of the association and affiliated organizations will be permitted to exhibit, but as these comprise all the leading automobile and accessory houses it is expected that a large number of automobiles, trucks, tractors and motor boats of the latest models, and accessories of all kinds will be shown.

Automobile Transportation Co. Proposed, Shantung.—It is reported that Mr. Moh Fan-dong has applied to the industrial bureau at Tsinan for the organization of an autobus transportation company with a capital of $20,000 to operate a regular service on the newly-built road from Tsinan to Lao-kow.

Autobus Service Planned, Shantung.—According to report from Tsingtao, a certain Mr. Liu has associated himself with the gentry of Tsingtao and Ping-doo for the organization of the Kao-Tung Automobile Transportation Co. to run a regular service in eastern Shantung and has decided to build an automobile road between Lan-cheng and Ping-doo as its first line to be operated.

AVIATION

A Water Glider for Use in China's Commerce.—The *Journal of Commerce* announces that satisfactory trials have been completed on the River Saone in France with a new type of water glider, fitted with a six-cylinder motor, which has been ordered by the Chinese government for the conveyance of merchandise and passengers on the great rivers. The makers claim that in favorable conditions the machine is capable of exceeding 50 miles an hour when carrying 12 passengers.—*Reuter.*

Extension of Aviation Activities, Japan.—The Japanese war office has a scheme under contemplation for extending the scope of the aviation corps. It proposes to establish a bombing corps. It has estimated Y.10,000,000 in the next year's budget, Y.5,000,000 being claimed for the first year of its initiation.—It is understood that this decision is not a consequence of the forthcoming disarmament conference.

Japanese Company to Manufacture Airplane Propellers.—According to the *Osaka Mainichi Shimbun*, a Japanese company manufacturing pianos and organs has been designated as a factory to manufacture airplane propellers. It is understood that this company, in addition to the manufacture of pianos and organs, developed since the outbreak of the war, a large export business in harmonicas, chiefly with the United States. In recent months it has encountered such formidable competition from German goods, said to be better and cheaper, that it decided to initiate this new business.

The Success of Chinese-made Sea-Planes in Foochow.—The sea-planes constructed in Foochow have been tested twice by Mr. Hackey, manager of Brunner, Mond & Co. Great satisfaction was shown as the result of the tests. It is generally believed that this is the first success in the history of the construction of sea-planes in China.

Arrival of the New Pilots.—It is reported that the aeronautical department has engaged four new pilots from England and America for the service on the Peking-Shanghai Air-line. These are Capt. Jones, Capt. McMullin, Capt. Campbell Orde and Capt. Dollan. They have arrived in China and have commenced work.

BRIDGES

New Bridge for Canton.—The dilapidated wooden bridge spanning the creek separating East Bund from Tai Sha Tou Island at Canton will shortly be replaced by a modern concrete bridge. While the new bridge is under construction a temporary bamboo bridge will be built for light traffic.

BUILDINGS

New Amusement Resort Planned.—A Hangchow merchant, Mr. Chu, is the promoter of a scheme for building an amusement resort at the West Lake on the same lines as the New World here. A piece of land at the corner of Ping Hai Road near the lake has been purchased for the purpose.

Railway Hotels for Chinese Government Railways.—The ministry of communications has recently sent a circular telegram to the various railway administrations under its control, stating the necessity of opening railway hotels at principal ports along Chinese railways and pointing out the successful result of such institutions conducted by the South Manchuria Railway. The telegram adds that the Tientsin-Pukow line has decided to build hotels at Tsinan, Tai-an and Chu for, and Peking-Hankow line is choosing a site for the purpose at Si-ling and Tih-kung-shan, and in conclusion it instructs the various administrations to make plans for carrying out similar works at suitable points so as to afford comfort and convenience to the travellers.

COMMERCIAL

Market in Dutch East Indies for Tobacco Spraying Outfits.—Experiments are being conducted in Sumatra leading to the eradication of insect pests injurious to tobacco plants, both in the seed beds and in the field. Native methods and spraying devices of other countries have been tried and found unsatisfactory, and therefore catalogues and specifications of the various types and sizes of modern spraying machinery are now desired from the United States, writes Consul C. O. Spamer. The price of each outfit should be stated. Quotations should be c.i.f. Belawan (port of Medan) if possible, and be given in lots of 100. After a thorough study of the merits of each machine the manufacturers will be asked to send samples for actual demonstration upon the tobacco estates. Hand sprayers of 15 to 20 liters capacity are first desired for use upon seed beds. If these prove satisfactory, orders will be placed for machines for field use. The latter should have a capacity of 20 to 50 liters. The ultimate purchase of the seed-bed spraying device, which meets the requirements of the experiment station, will be about 1,000 outfits. The number of larger machines ordered will depend upon the success of the smaller machines. Shipping and packing instructions, terms of payment, etc., will be arranged after a satisfactory machine has been selected. All communications may be in the English language. The address to which catalogues may be sent is available upon request to the Far Eastern division.—*Commercial Reports.*

Trade Promotion, Japan.—The South Sea Traders Union has been incorporated with a capital of Y.1,000,000 for the purpose of promoting trade in the South Seas by guaranteeing export and import bills or letters of credit, with special reference to those issued or accepted by its own members.

The chambers of commerce are urging the railway to grant a discount in freight rates on export cargo and fuel. The reduction in rates would stimulate export trade while reduction in coal transportation rates would benefit domestic industries. The Yokohama Export Association's application for a reduction of European Kyushu rates has not been favorably received. The exporters maintain that rates are out of proportion to the value of the goods, but the steamship companies reply that a 40 per cent. reduction this year, as previously granted, is more than should have been expected, considering the increased cost of operation.

The federated chambers of commerce have petitioned the government to supply to exporters of reputation sufficient capital at low rates of inter-

est to insure an improvement in the nation's foreign trade. It is rumored that the government, through the Yokohama Specie Bank, will make a loan of Y.2,000,000 at low interest to finance Russian trade.

Java's Trade Prospects.—The annual report of the president of the Java Bank says that the general economic situation in the Netherlands Indies is not brilliant but there is no question of an economic collapse.

The normal demand for Indian products will return as soon as normal world-conditions return.

The conditions of trade, industries and agriculture in the Dutch Indies need not give reason for any great anxiety for the future.

The position of the Java Bank and the mutual co-operation between other banks in the Dutch Indies is a guarantee that the difficulties of the Dutch Indies will be overcome earlier than elsewhere.

The Dutch Indies is not standing on the eve of an economic downfall. The Java Bank dividend is 35 per cent.

COMMUNICATIONS

A New Line Proposed, Chang-Nu-Shan.—A plan has been prepared by several prominent figures of Chang-nu-shan, Chekiang, for the construction of a motor-road or a light railway in that city to facilitate communications between Chekiang and Kiangsi, and the proposal is under consideration of the local magistrate.

North-West Automobile Transportation Co.—It is stated that a certain ambitious Chinese capitalist will give financial support to the North-West Automobile Transportation Co., Kweihua, and its rapid improvement in business is therefore expected. An autobus service will also be inaugurated between Pao-der-ching and Wu-yuan and additional lines will be opened from time to time.

DEVELOPMENT

Singapore's Needs: $100 Million Scheme.—At a special meeting of the Singapore municipal commission, the president and the chief engineer outlined the needs of the town and the bringing up of all the departments to a satisfactory state, involving the spending of $100,000,000 in ten years. The scheme needs the flotation of a loan and also an increase in the rates to 32 per cent. together with government grants and fresh sources of revenue. The meeting approved the scheme.

The requirements of Singapore, according to a summary of the report made by the *Free Press*, are :—

More water now and a margin of safety for the future.
Eighty-five per cent. of the roads to be reconstructed.
Water-borne sewage for the other 98 per cent. of houses.
Electric light for streets and houses.
Cheap and efficient tram service.
Re-housing schemes and arterial roads.
New abattoirs, new municipal offices, houses for staff, new small town hall, landing facilities and extensive reclamation works.

New Corporations Under Organization.—According to latest report to hand, the following corporations are being organized :—

Shih Sing Agriculture and Labor Bank, Wai-ping, Chihli.
Cereals Exchange of Suiyuan by Mr. Li Ngao-ching.
Kwei-Sui Electric Light Plant at Kwei-sui by Mr. Yung Yao-chen.
Kung Lee Coal Mining Co. by Mr. Feng Kung-doo.
Song Huh Chen Leather Co. by Messrs. Tser Song-dang and Chang Ting-kai.
Wang Jao Dyeing and Weaving Co., Kiangsu.

Registration of New Corporations.—According to report to hand, the following corporations have been lately registered with the ministry of agriculture and commerce :—

Chow Chang Telephone Co., Chow-cheng, Shan-tung
Tah Foong Dyeing Co., Ltd., by Mr. Yue Pao-shan.

Development of Sungkiangchin, Heilungkiang.—With regard to the opening as a commercial port of Sungkiangchin, a town in Heilungkiang situated on the northern bank of the Sungari River opposite Harbin, a series of schemes has been drawn up by the port work office, the following being a summarized account :—

(1) A strong modern embankment will be raised along the Sungari River from the iron bridge of the Chinese Eastern Railway over the Sungari River to Foo-lan Sugar Factory, a distance of about ten *li*, and in future wharves will be built at suitable points.
(2) Three main streets each having a width of 110 feet to be reserved for laying of tramway track, and many branch streets with a width of 80 feet will be built.
(3) A light bridge will be built over the Sungari River to connect the port with Harbin.
(4) A railway costing about $6,000,000 will be constructed from the port to Hai-lun, about 500 *li* in length.

Registration of New Corporations.—According to latest report to hand, the following corporations have been officially registered with the ministry of agriculture and commerce :—

Dung Woo Match Box Factory, Chekiang.
Kwang Hua Electric Light Plant, Pengpu.
Yue Ching Flour Mill, Chihli.

ELECTRICITY

Formosan Hydroelectric Project.—The Formosan hydroelectric project is to be carried through, reports Commercial Attaché James F. Abbott, which is contrary to his previous impressions on this matter. The copper for the transmission lines has been bought, taking advantage of the present low prices. This project was reported in further detail in *Commerce Reports* for June 10, 1921.—*Commerce Reports.*

New Electric Light Plants Under Organization, Kashing.—Mr. Shun Nien-zai has secured permission of the Kashing authorities to open an electric light plant in Ka-zai, a district near Kashing. Mr. Chu is proposing a similar organization at Pu-yuan-chen, Kashing, and another electric company at Sin-dung-chen, Kashing, will probably be established in October.

Electric Light Plant Established, Hwai-ying—After registration with the ministries of communications and agriculture and commerce, the Lee Hwai Electric Light Co. has officially opened for business.

A Hydro-Electric Scheme.—Reuter's service from Tokyo mentions the scheme under way to establish the Abukumagawa Hydro-Electric Co., and the Tokyo Electric Transmission Co. The first will have a capital of 10,000,000, and develop 55,000 kw. by harnessing the Abukuma River, Fukushimaken, while the other company will have a capital of Y.30,000,000, and supply this power to Tokyo. Application has also been made to the government for a charter to construct a high-speed electric railway between Tokyo and Nikko, a distance of 80 miles. Under this scheme it is proposed to cover the distance in two hours.

Electric Plant is Planned; Rubbish for Fuel.—Suburban residents of Tokyo who have been suffering from the accumulation of rubbish and waste materials amounting daily to about 25,000 *kan* in weight recently decided to utilize it for fuel of electric power stations. It was decided at the meeting of the residents of Shibuya, Sendagaya, Yodobashi, Okubo and other suburban districts in the western outskirts of Tokyo held recently that two power stations installed with furnaces for consuming rubbish should be established with the capital of Y.500,000 near the crematory at Okamidani, Yoyahata, and the Gunritsu Hospital at Kashiwagi, Yodobashi, as a joint enterprise of the seven suburban districts.

According to the plan, 5,000 *kilo* of electricity is to be gained by the daily consumation of 25,070 *kan* of rubbish and the construction of the power stations is to be contracted for immediately. As a result of investigation carried out in Yokohama the rubbish and wastes in Japanese towns are said to contain twice the amount of combustible materials compared with that in England. It is estimated that the enterprise will yield a daily profit of Y.388 or 5 sen per *kilo*. The proposal is expected to be launched soon, according to the paper.

Some Electric Light Plants Under Organization, Soochow.—Since the introduction of electric light to Wang-tee, Soochow, many towns of the district are contemplating the organization of electric plants. In Hu-kwan a company has been promoted by Mr. Chang Chung-tsing and is expected to operate within this year, machinery having been ordered from Shanghai. In Mo-do-tze a similar plant is also being organized by Mr. Nieh and operators will begin as soon as the machinery ordered from Shanghai has been installed.

ENGINEERING

Suction Gas Plant for China.—Attention is being drawn to the demand for suction gas plant in China. Its relative cheapness appeals strongly to the Chinese. Whilst the course of exchange is just now retarding the installation of new machinery on a large scale, the demand for new plant by local electric lighting companies is becoming increasingly urgent. In these circumstances, the employment of suction gas is recommended. In the centres most concerned coal is obtained locally, anthracite usually being available, and its price is not subject to the vagaries of exchange. The installations of suction gas plant at present in operation have created a very favorable impression. Several concerns in China supplying light and power are taking steps to obtain additional capital. As they must soon come into the market for machinery for extensions and renewals, it is believed that an important potential demand is developing for prime movers operating on suction gas.

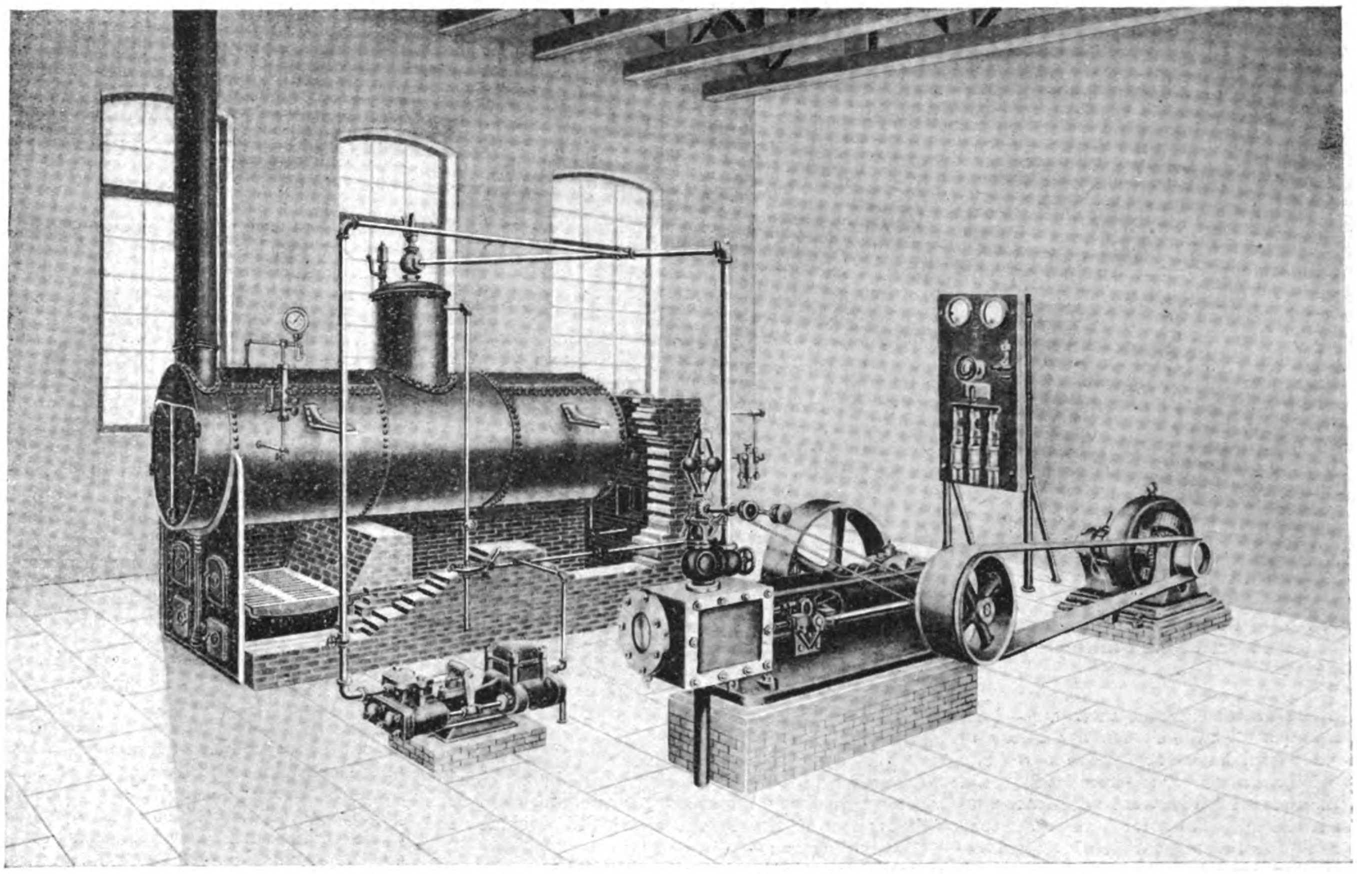
Engineering Works Inaugurated, Hsuchow.—As a result of industrial development in Hsuchow, there has been a great demand for machinery and other engineering tools in the city. With this in view, Mr. Nu Hsian-ting, proprietor of Tsing Heng Printing House, has opened the Tsing Shun Engineering Works to manufacture weaving machines, gins, printing machines, etc.

Chinese Iron Works Co., Woosung.—The Chinese Cotton Mill Owners Association, Shanghai, is organizing the Chinese Iron Works Co., at Woosung, to manufacture machines and engineering tools for cotton mills' use. The company is capitalized at $300,000 in 3,000 shares of $100 each, and the factory building on a site of 40 *mow* will be completed at the end of the year.

Orders for German Machinery in China.—It is reported that Mr. Kokan, manager of Simens China Electrical Engineering Co., has recently made a bargain for supply of machinery and engineering tools to a new coal mining company which is to be situated at Kung-chen-jao, Hangchow, organized by General Lu Yung-hsiang, tuchun of Chekiang, with an object to exploit coal resources in the vicinity of Hangchow and to melt and cast mineral products actuated along the lower courses of the Yangtze. A heavy shipment of machinery including 6 tramcars and various kinds of electric supplies have been ordered from Germany by Mr. Kokan on behalf of the proposed mining company and Shanghai Chinese Tramway Co., and a part of the machinery has been already carried to Shanghai by Japanese steamers.

COMMERCIAL FINANCE

A New Trust Company, Tientsin.—General Li Yuan-hung, ex-president of the republic of China, is organizing the Hua Chen Trust Co.



Type of small power unit which can be delivered from stock

The responsible heads of an industry which depends on its power plant will place reliability at the head of a list of requirements for power generating purposes.

To meet this requirement in the fullest possible manner and with due regard to initial cost and operating expense, a steam plant of the type pictured above transmitting its energy through electric generators, has been designed.

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Co-ordinated engineering and manufacturing effort have made these units possible and their splendid performances in regular service proves them well adapted for industrial and lighting plants requiring economical and reliable generation of electric power.

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in Tientsin with a capital of $10,000,000, whose object it is to transact industrial loans to individuals and government.

Chinese Banking.—Soochow bankers are organizing a Bankers' Association, reports the bureau of economic information. The branch managers of the Soochow Bank, Shanghai Commercial & Savings Bank, Bank of China, Bank of Communications, Continental Bank, Kiangsu Bank, Wah Foo Commercial Bank, Hui Shang Bank, Hwei Hai Industrial Bank, among others, are the promoters.

The Industrial Bank of China's new branch at Ningpo reports that the opening deposits amounted to $2,800,000.

In compliance with the order of the provincial government, the local gentry and the public fund and property bureau of Shanghai have jointly proposed the establishment of the Shanghai Agricultural & Industrial Bank. The capital is fixed at $400,000, two-thirds of which has already been subscribed. A meeting of directors is to be called to location of the bank and to make necessary arrangements for registration.

The Nan Hwei Agricultural & Industrial Bank will shortly be established with a capital of $100,000. Half of that amount has already been subscribed, and subscriptions are still being received. The inauguration is expected to take place this September.

Chinese and American Bank of Commerce to Have a Branch in Fukien.—The Chinese and American Bank of Commerce is contemplating the establishment of a branch in Fukien.

Plans for a Sericultural Bank in Japan.—It is stated in the *Japan Chronicle* that a number of silk weavers of Japan have formulated a definite plan for the establishment of a sericultural bank. Inasmuch as the present government relief measures must necessarily be only temporary, it is believed that such a bank for the promotion of sericulture and weaving should be established for the permanent aid of the silk industry.

GOVERNMENT FINANCE

Reported American Loan.—The *Shanghai Journal of Commerce* published a report to the effect that a leading banker has made a statement to the effect that an American firm has entered into an agreement with the Peking government for a loan $5,000,000 at 85. The loan will bear interest at the rate of eight per cent. and the customs surplus will be used as security.

Loan Against Telephone Exchange.—The Kuo Wen News Agency learnt recently by a telegram from Hankow that Wu Pei-fu is believed to have proposed the mortgaging of the Telegraphs and Telephone Company of Hupeh to a "certain country" in return for which he would receive a loan of $1,000,000, fifty per cent. of which is to be paid in advance.

The Gold Yen in Kuantung.—The gold standard question, complications of which have lasted six months, is reported to have been brought to a settlement. Forward bargains with valuation in gold were opened recently and are being smoothly carried on with many Chinese present at the market.

Dutch Banking Interests, N.E.I.—Several companies and corporations interested in banking and shipping in the Dutch Indies have founded a central council under the presidency of Dr. M. F. W. Treub, a former minister of finance, for the purpose of safeguarding their common interests.—*Reuter.*

Loan for Fishing Industry.—The commissioner of wine and tobacco for Chihli province, says the *Kuo Wen News Agency*, has proposed that a loan shall be made from the Japanese for $15,000,000 on the fishing industry which shall be carried on jointly by Chinese and Japanese.

The New Railway Loan, China.—The ministry of communications announces that the 8 per cent. short term railway car purchasing loan, which was approved by mandate on January 26, is open to subscription.—*Reuter.*

Chinese Bonds and Loans.—The bureau of economic information publishes the following notes regarding Chinese bond issues and notes.

The ministry of communications has issued short term bonds to the value of $4,000,000 for the Peking-Hankow Railway. The conditions are as follow:

Interest, 8 per cent. per annum.

Price, 92.8.

Repayment of principal, 4½ years in nine instalments.

The subscription of the bonds began on August 16 and will end on September 30. An amount of $100,000 will be retained from the receipts of the railway, and deposited at the following six banks: the Bank of Communications, the Kin Cheng Bank, the Salt Industrial Bank, the Continental Bank, the Sin Hwa Savings Bank and the Bank of China.

The denominations of the $6,000,000 car loan bonds issued by the Chinese Bankers' Association are $100, $1,000 and $10,000. The bonds are now on the market.

A British Loan Signed.—In 1919 the ministry of communications concluded a loan of $2,000,000 which the Anglo-Chinese Syndicate for the purchase of rolling stock for the Canton-Hankow Railway, but the government stood to lose a considerable amount on the transaction through losses in commission and in exchange as affected by the European war and consequently the loan was insufficient to meet the requirement. Recently, it is officially reported that the ministry of communications has again signed a loan with the syndicate, under approval of a cabinet meeting, amounting to $850,000 to be spent in purchasing adequate railway materials for the aforesaid line. The terms of the loan are said to include the following items:—

(1) Amount of loan to be $850,000.
(2) Interest to be 8 per cent. per annum and to be paid semi-annually.
(3) Repayment of principal to be made in monthly installments of $150,000 each, beginning in January, 1922.
(4) Commission to be 15 per cent.
(5) The loan to be secured on the revenue surplus of the Peking-Mukden Railway after deduction of securities on other loans.

FORESTRY

Immense Supplies in Philippines.—The Philippines have sufficient timber to provide for the needs of most of the Far East, according to Major-General Leonard Wood, who recently commented on the forest resources of the islands as follows:

"Few people appreciate the enormous resources of the islands in the way of lumber; much of it is lumber of the most valuable kind. In the Philippines there is lumber to take care of most of the lumber industry in the Far East; nearly 230,000,000 feet of it was cut in 1920, of which in the neighborhood of 15,000,000 feet was exported."

"In ordinary years there ought to be an enormous amount available for export. Now is the time to initiate those wise forestry measures which would insure the replacement of trees cut."—*Reuter.*

GENERAL

Plan to Open Commercial City Maturing.—There is every reason to believe that the plan to open Chengchow, Honan, as a commercial port will soon be carried out, for the Honan provincial authorities and the ministries concerned in Peking are ready to support the undertaking. A survey of the place is being made and regulations governing the undertaking are being drawn up.

$1,000 Prize for Design of New Coinage.—The Shanghai government mint are offering a prize of $1,000 for the best design for the new coinage. The principal qualities that the design should embody are as follows:

1. The design shall be such as to enable every one to recognize at sight that the coin bearing it is of Chinese currency.
2. The design shall have some relation to Chinese history.
3. The design shall be permanent in nature.
4. The design shall be clear and neat.
5. The design shall be such as makes counterfeiting difficult.
6. The design shall be easily modelled.
7. The design shall be such as makes "scratching" difficult.
8. The design shall be endurable.

New Companies Registered.—According to report from Peking, the following corporations have been officially registered of late with the ministry of agriculture and commerce:—

Hua An Forestry Co., Kirin.
Ching Pu Forestry Co., Kirin.
Yue Fong Forestry Co., Kirin.
Electric Light Plant, Lao-hu-kow, Hupeh.
Foong Hua Needle Manufacturing Co.
Mai Lee Chen Soap Manufacturing Co., Foochow.
Sung Chang Wood-Sawing Co., Ltd., Wuhu.
Wei-hsien Waterworks Co., Weihsien, Shantung.

INDUSTRIAL

New Yarn Company.—Shen Lien-fang, former vice-chairman of the Chinese general chamber of commerce, has organized a new cotton yarn concern at a capital of $2,000,000. The yearly output is estimated at about £8,000,000. In advocating for the development of the cotton yarn business Mr. Shen points out that Japan with a population of 60,000,000 has 4,000,000 spindles while China with a population of more than 400,000,000 has only 2,000,000 spindles.

1921 Output of Philippine Hemp.—This year's output of Manila hemp in the Philippines will be only 600,000 bales, a little less than 50 per cent. of normal production, according to statistical reports obtained from several sources. Production last April amounted to 52,572 bales only, as against an average production of 105,346 bales for the same month during the past five years. During the months of January, February, March and April, 1921, the output totaled 214,176 bales as against the average production of 386,925 bales for the same 4-month period in the past five years. It is estimated that at this rate of monthly production for the rest of 1921 the Philippines will yield only 600,000 bales of hemp.

New Chemical Plant Starts at Haiphong.—A large factory for the production of chemical products has just been constructed at Haiphong, French Indo-China, by the Societe Industrielle de Chine d'Extreme Orient.

The first products to be manufactured are caustic soda, chlorine, oxygen and chloride of lime. The soda will be produced by the electrolytic treatment of chloride of sodium.

The works cover a superficial area of 23 hectares (roughly, 10 acres), with 600 metres of wharves on the river and two jetties, and also possess an electric power station, lime kilns, sawmill and a cooperage.

Under normal working conditions three tons of soda will be produced daily.

The opening of these works meets the immediate requirements of those Indo-Chinese industries using soda, such as paper mills, glass works, etc.

The spinning and weaving mills will also depend upon these works for bleaching, and the oil mills also for oxygenation of oils.

On the other hand, it is also intended to manufacture sulphuric acid, carbide of calcium and artificial manures, which now have to be imported in large quantities for the coffee, tobacco and other cultivations.

A Large Cotton Mill Under Projection, Shanghai.—Mr. Koo Tung-chen, who has practised for several years in an American engineering works after graduating from a cotton spinning

college, U.S.A., and has much experience in cotton industry, has planned with Mr. Shun, a wealthy Chinese merchant, for organization of a large cotton spinning and weaving factory in Shanghai. The proposed mill will be equipped with 10,000 spindles and will have a capital of $2,000,000, of which $1,300,000 will be devoted to purchasing machinery. Its average annual output is estimated at about 20,000 bales of 40 pounds each and a profit of $1,220,000 is expected to be netted yearly.

The Kofa Aerated Water Co.—Nine Chinese have organized the Kofa Aerated Water Co. in co-operation with the American Drug Co., according to the Chinese press. The capital of $150,000 has been fully subscribed and a plant will be constructed at Ward Road, Shanghai. The machinery, the Chinese papers say, will be ordered from Germany.

New Industrial Plant for Foochow.—A new industrial plant hae been established in Foochow for the tanning of leather and the manufacture of alcohol. The leather will be made by the most modern process. The alcohol will be produced from sweet potatoes and the process will yield a liquid 97 per cent. pure.

Chemical Plant in the Far East.—A large factory for the production of chemical products has just been constructed at Haiphong, French Indo-China, by the Societe Industrielle de Chimie d'Extreme Orient. The first products which will be manufactured are caustic soda, chlorine, oxygen and chloride of lime. The soda will be produced by the electroyltic treatment of chloride of sodium. The works cover a superficial area of 23 hectares, with 600 metres of wharves on the river and two jetties, and also possess an electric power station, lime kilns, sawmills and a cooperage. Under normal working conditions three tons of soda will be produced daily. The opening of these works meets the immediate requirements of those Indo-Chinese industries using soda, such as paper mills, glass works, etc. The spinning and weaving mills will also depend upon these works for bleaching, and the oil mills also for oxygenation of oils. On the other hand, it is also intended to manufacture sulphuric acid, carbide of calcium and more especially manufacture of artificial manures which have so far to be imported in large quantities for the coffee, tobacco and other cultivations.

A New Factory, Works.—Chinese capitalists in Peking have started a new printing works outside Chienmen with a capital of $200,000 and plan to run a school for compositors in connection with it.

A New Paste Factory, Shanghai.—The formal opening of the six new factory of the Hing Wah Paste Manufacturing Co. will take place on Ferry Road some time next month. This company is one of the pioneer Chinese companies and has a capital of $1,000,000.

Debby Looms Installed.—Mr. Thomas G. Wong has established at 699 Markham Road, the China A. B. C. Underwear Weaving Co., which boasts the first set of debby looms ever imported into China and which can be converted to the weaving of fancy work. The mill produces four different kinds of underwear: union suits, two-piece suits, athletic suits and Chinese under-dress in separate pieces. The daily output is about 3,000 pieces.

Formal Opening of New Spinning Mill.—The formal opening of the Hua Foong Cotton Spinning Mill, Ltd., will take place at Woosung from 10 a.m. to 4 p.m. on the 27th instant. Mr. C. C. Nieh, chairman of the Chinese general chamber of commerce, is president of the board of directors of the new mill, and Dr. C. T. Wang is managing-director.

Model Spinning & Weaving Factory Proposed.—With a view to encouraging spinning and weaving enterprise, the ministry of agriculture and commerce has decided the establishment of a spinning and weaving factory in Peking which is to be served as a model for similar mills throughout China: and a delegate to make arrangements for its organization has been appointed.

Two New Factories in Yu-Yao, Chekiang.—Messrs. Ling Ping-yao, Yao Chang-ching, Lee Kao-sung and Chu Shao-chien are organizing a silk filature to be known as Tze Dah with a capital of $2,000,000 in the city, and Mr. Wu Shao-ching is establishing the Yih Lee Cotton Mill at Lo-chia-teng in the eastern district of the city.

Varnish Manufacturing Co. Under Organization, Tientsin.—It is reported that the Dah Shen Varnish Manufacturing Co. is being organized by Mr. King Yuan-sung at Tong-kar-kew, Tientsin.

Shun Hua Co. to have Branch in Peking.—It is reported that a branch office of the Shun Hua Paste Co., Shanghai, will be established in Peking.

A New Japanese Cotton Mill Under Organization, Mukden.—The Japanese Cotton Spinning and Weaving Factory, which has been in the course of construction at Mukden, has increased its capital from Y.4,000,000 to Y.5,000,000, and is to be equipped with 20,000 spindles intsead of 10,000 as originally announced. Machinery and factory equipment have been supplied by an American firm and work will commence in July, 1922.

A Large Confectionery Establishment Will be Formed in Soochow.—Mr. Chu Sung-yen, an experienced confectioner, has collected a sum of $10,000 to form a confectionery at Kwei-chien Street, Soochow.

A New Cotton Mill in Nantungchow.—Messrs. Liu Tung-yi and Sung Chin-jen are planning the organization of a cotton spinning mill with a capital of $400,000 at Kiu-hua-shan in San-lo-shang, Nantungchow.

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A Hair-Net Factory Established, Hsuchow.—Chinese hair-nets have formed a part of China's export trade in value amounting to $20,000,000 yearly. In Hsuchow, there has been established a factory to knit hair-nets. The factory has been organized by Mr. Lee Yi-sun, and registration has been made with the industrial bureau, Nanking.

A Paper Mill Under Contemplation.—Messrs. Yuan Ting-hung and Chang Hung-tien are planning the establishment of a modern paper mill at Chan-pai-jao, Yueyao, a paper-producing place in Chekiang. The factory, operated by modern machinery, is to be known as Hung Dah Paper-making Improvement Factory, as the promoters have intended to improve the paper-making industry of which the city used to be so proud before the import of foreign papers.

Industrial Factory, Chekiang.—With a view to developing industry at Chong-shih-chin in Hsiang-shan-hsien, Chekiang, which has always been a large commercial centre in the interior, Mr. Chu Sin-shan, a wealthy merchant, has planned the organization of an industrial factory at that place. The factory is to be divided into ten manufacturing departments—indigo, paper, drapery, soap, towel, hosiery, carpentry, gold and silver smiths, dyestuff and machinery—and work is expected to begin in September

A Chinese Tobacco Co. Proposed.—My. Wang Sui-kai, director of the tobacco taxation bureau, is proposing to establish the China Tobacco Co. in Shanghai to compete with foreign factories. It is reported that the new company is to be run under the management of Chinese officials and merchants.

An Oil Mill Under Organization, Shantung.—Mr. Chang Kung-li, a merchant of Zee-hu, Shantung, is organizing an oil mill with a capital of $80,000 at Pic-pei-tze in Lihchen, Shantung, to squeeze oil out of sesame and peanut, which are some of the principal exports of Shantung.

A Flour Mill Under Organization, Tsinan.—Mr. Chang Tsan-jen is establishing the Hua Ching Flour Mill at Tsinan, Shantung, with a capital of $400,000, half paid-up, and the new organization has been officially registered with the ministry of agriculture and commerce.

Glass Factory in Shantung.—Mr. Yeh Kung-cho, high industrial commissioner of China, has submitted to the ministry of agriculture and commerce for approval a set of regulations for the resumption of business of the glass factory at Pao-shan, Shantung, which suspended business sometime ago.

MINING

Tin Deposits in Kuangsi.—Rich deposits of tin are being worked in the region of Hoyuan, in Kuangsi. Another tin mine has just been opened and a tin smelting works established.

A New Coal Mine, Fengtien.—Under approval of the ministry of agriculture and commerce, Mr. Chang Pao-yung, a wealthy merchant of Mukden, has collected the sum of $100,000 to operate the coal mine at Dah-pai-ling-tze in Pang-chee-hsien, Fengtien. The property is said to cover an area of over 1,000 *mow.*

Silver Mine Discovered, Wenchow.—A silver mine has been recently discovered at Yue-kong-shan in Yung-chia-hsien, Chekiang, by Mr. Shun Hua-kwei, a returned student from Japan, who has applied to local authorities for permission to operate it.

The Changhsin Coal Mine.—A coal mine has recently been opened on a modern scale in the famous Huchow district. The mining area measures 40 square *li.* Two seams of coal have been opened up. The first seam is about five feet in thickness and the second eight feet. The coal is of the anthracite variety and is said to be excellent.

A Gold Mine Discovered, Shantung.—A gold mine covering an area of hundreds of square feet has been lately discovered at Hsu-char-ling in Lai-foo, Shantung, and Messrs. Chao Yung-nien and Chang Kwei-yuan, local gentry, have raised a fund of $20,000 to undertake its development.

Soapstone Mine will be Worked, Fengtien.—Mr. Wang Mow-shun has been permitted by the industrial commissioner at Fengtien to operate the soapstone mine recently discovered at Nan-shih-mu-kur in Hai-chen-hsien, Fengtien. A capital of $20,000 has been raised for the undertaking.

Coal Mine to be Operated, Fengtien.—Mr. Liu Nu-feng has been authorized by the industrial commissioner at Mukden to open the coal mine extending over 800 *mow* in area at Dah-song-hsu-ting-tze in Si-foong-hsien, Fengtien.

Pao-Yuan Coal Mining Co. Extending Its Working Area.—A track of land covering about 100 *mow* has been silted up through the flood during the last year on the east of the mineral area possessed by the Pao-Yuan Coal Mining Co. at Tse-wu-tung in Fu-shun-hsien, Fengtien, and the said company has applied to the local industrial commissioner for the ownership of the new land.

New Mining Regulations: Java.—A copy of the new regulations relating to the prospecting for and mining of minerals under the Netherland East India Mining Law, which came into force on 1st July, has been received from H.M. minister at the Hague. The new regulations cancel previous ones of the above nature and state that the government has no objection to the establishment of mining enterprises in those regions which hitherto have not been regarded as being open to general mining. From 1st July applications for prospecting licences may be made for such regions,

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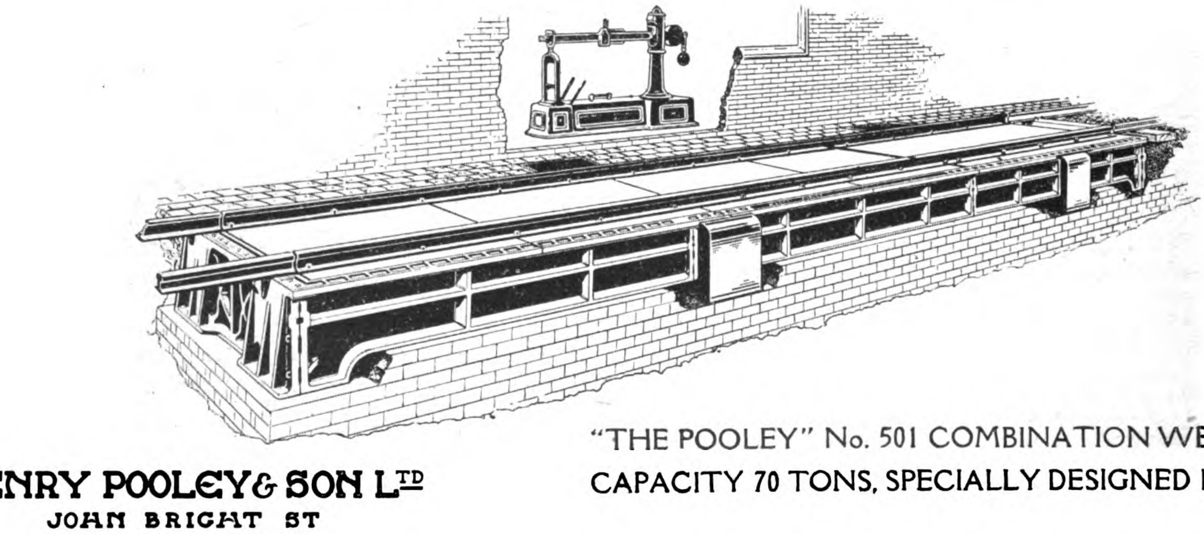

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Development of Copper Resources: Netherlands Indies.—H.M. consul-general at Batavia reports in the *Board of Trade Journal*: Since the discovery of rich copper deposits near Taninj, in South Timor (see the *Journal*, of 25th March, 1920, page 442), extensive exploring and developing work has been carried out by the Dutch government geological department, and, judging by the quantity of miscellaneous machinery and hand tools that have recently arrived at the mine, and the number of whites engaged, the deposits are assuming some importance.

It has been reported that in the neighboring district tin has been discovered equal in richness to anything yet found on the Island of Banka. Should this be the case it will lead to important developments in Timor, and it is advisable that the future working of these mines should be watched with a view of United Kingdom firms supplying the necessary plant and machinery.

"It has been reported that in the neighboring district tin has been discovered equal in richness to anything yet found on the Island of Banka. Should this be the case it will lead to important developments in Timor."

Japanese Opening Shantung Coal Mine.—Some Japanese interests have associated themselves with the Shantung officials for the organization of a coal mining company to develop the mineral wealth at Nan-ting-chen in Tze-chuen-hsien, Shantung. The property covers an area of over 600 square *li* and the coal deposit extends 7-ft. 5-in. in width. Twenty-four parallel seams have been proved and the deposit is said to be sufficient for supplying the whole province of Shantung with fuel. The new company is capitalized at $6,000,000, of which the Japanese have provided $3,000,000 and the rest is to be subscribed by Chinese officials.

New Coal Mine to Operate.—The industrial commissioner at Mukden has permitted Mr. Li Pai-chu to open the coal mine at Shar-kar-wai-tze in Nee-hsien, Fengtien, which covers an area of over 900 *mow*. A capital of $70,000 has been raised by Mr. Li to undertake the enterprise.

Operation of Mineral Resources Granted.—According to latest reports, the ministry of agriculture and commerce has permitted the following concerns to operate as mentioned :—

Liu Ching-sun to a open coal mine at Shih-hu-chen in Liu-hu-pai, Fengtien.

Wu Cho-kan to open a coal mine at Yang-lu-tung in Nih-hsien, Fengtien.

Ma Tze-jao to open a coal mine at Sun-dee-shan in Fu-kao-ching of Taiyuanfu, Shansi.

Wu Chung-hsu to open a lead mine at Ma-der-shan in Hsu-chang, Chekiang.

Wang Yao to open a coal mine at Si-kao-kiu in Yang-l-kiu, Chihli.

Shiao Yu-ying to open a coal mine at Si-kiu in Wong-shan and at Lung-shai-kao in Wai-ping, Chihli.

Chen Sheng-pao to open a coal mine at Dah-lu-shur-kiu in Tung-hua, Fengtien.

Shu Chen-deng to open a coal mine at Feng-ma-kiu in Yee-tung.

100,000 Tons Iron Ore from Johore to Japan.—The other day, a Weltevreden correspondent asked whether it is true that 5,000 tons of iron ore is being shipped monthly from Johore to Japan. Another correspondent says he does not know the quantity but export does take place, the ship lying outside, near Pengarang and after loading she sails direct for Japan.

Another correspondent states that the Nanyo Ironworks (Japan) has a concession from the Johore government to work the ore at Batu Pahat.

The Mitsui Bussan Kaisha have a contract to ship 100,000 tons this year to Japan. No doubt details of this new industry will be given officially in due course.—*Straits Times*.

OIL

Petroleum Production in Japan and America.—The output of petroleum in America is reported to be steadily on the increase and the amount turned out during 1920 indicated a gain of about 20 per cent. as against the preceding year. The annual production of petroleum in America now represents 14 per cent. of the total world production, while the output of the same in Japan is decreasing year by year since 1916, when a record output of 2,643,175 *koku* was obtained. The amount of petroleum turned out in Japan during the past six years in comparison with that of America is as follows :

	Output in Japan *koku*	Output in America *koku*
1915	2,613,281	281,104,104
1916	2,643,175	300,767,258
1917	2,600,207	355,927,716
1918	1,230,253	355,927,716
1919	2,070,296	377,719,000
1920	2,087,001	443,402,610

Vegetable Oil as Fuel, East Indies.—The possibility of using vegetable oils as fuel has often been considered, and among the oils tested in recent years are castor oil, ground-nut oil, and palm oil. The two former have not proved very satisfactory, and ground-nut oil, in any case, would be too expensive; but in the case of palm oil the tests carried out recently have given very promising results. Obviously, it would be a great advantage to be able to use vegetable oils, for the supply of these is continuous or perennial, differing fundamentally in this respect from a mineral like coal or petroleum. Enormous supplies of palm oil are available in West Africa, and the supply in that part of the world alone could be made practically unlimited, to say nothing of the great extensions of oil palm cultivation to other parts of the world, notably the East Indies. Tests with this oil as a fuel were first begun in 1914 and resumed again after the war by a Belgian company the Omnium Africain—since amalgamated with La Compagnie Generale du Congo. It has a total capital of 20,000,000 fr. and its chairman is M. Renkin, the late Belgian colonial minister. A large English firm is also interested in the same problem, and has carried out some tests in the Congo which have proved very satisfactory so far. Both companies are largely interested in the oil palm industry, and the production of palm oil and palm kernels, and were not slow to realize the great economic importance of being able to use palm oil, especially low-grade unrefined palm oil, as an engine fuel. The matter is of particular importance in the Congo and other parts of the tropics, were fuel, both for industrial purposes and also for river navigation is extremely costly. The new fuel should be of the utmost value in the development of tropical industries. The engine-running tests were carried out in Brussels with an 8 h.p. Swedish engine, the Drott, which is a two-cycle semi-Diesel engine of simple design and strong construction. Palm oil is not entirely liquid at ordinary temperatures, so that it is necessary to have a specially heated feed tank for keeping the oil in a perfectly liquid state; and for the same reason it has so far been found necessary to begin and end the run with ordinary petrol. A small petrol tank is therefore provided in addition to the palm oil tank. It was found that low-grade unrefined palm oil containing a comparatively high percentage of free fatty acids could be used, the fatty acids being almost completely burnt, and there was no corrosion. This principally in British hands, the demand being supplied by the United Kingdom to the extent of 54 per cent., Penang and Singapore supplying 25 per cent. and Australia 10 per cent. 1918 saw no import from Great Britain whilst the British colonies supplied but a small quantity. On the other hand the United States which in 1913 were still excluded from this trade, supplied 90 per cent. in 1918 and 73 per cent. in 1919 of the total import into Java and Madura. The import statistics for the year 1920 show that Holland and Great Britain have once more conquered part of this trade, but this does not alter the fact that the greater part of the demand is supplied by the United States.

Imports of Oil: Japan.—According to a report to hand, Japan imported during the first four months of this year oils amounting to 236,500 gallons valued at Y.1,875,015. The details are as follows :

	Volume gallon	Value Yen
Crude oil	17,541	47,406
Naptha	78,999	791,430
Illuminating oil in cans ...	4,000	39,600
Illuminating oil not in cans	89,767	484,120
Mineral oil	460,191	512,459
Total	236,500	1,875,015

RAILWAYS

Receipts of State Railways, Japan.—According to official returns, the income from state railways during July last totalled Y.29,970,525, a gain of Y.4,138,210 as against the corresponding month of last year. The total receipts during the first three months of the current financial year beginning with April stood at Y.126,565,491, an increase of Y.10,669,246 as compared with the same period of last year, the average receipt per day per mile being Y.147.23. The details are as follows :

	July	April-July
Passengers carried	32,270,066	153,098,851
Freight carried (tons) ...	4,228,635	17,184,249
Receipts from passengers...	16,813,607	72,895,074
Receipts from freight ...	13,156,918	53,670,417
Total receipts (yen) ...	29,970,525	126,565,491

A New Railway in Fengtien Planned.—General Chang Tso-ling, inspector-general of Manchuria, has formulated a plan for building a light railway in the north-eastern part of the province of Fengtien. It is said that the government is ready to set aside $5,000,000 for the purpose, and that another $5,000,000 will be subscribed by the Chinese community in Fengtien.

Tokyo Subway Construction.—The proposed construction of a subway in the city of Tokyo has received much publicity in the Japanese newspapers during the past six months, writes Trade Commissioner H. A. Butts. Some of these news items have made it appear that it was only a matter of a few months before actual construction would be begun. One paper stated that at a regular of shareholders of the Tokyo Subway Co. held recently it was announced by officials that the geological surveying or experimental boring that is now being conducted along the proposed trunk line would be finished within this year and that in 1922 actual work would be started with the intention of finishing the trunk line by 1924. According to Mr. Butts the preliminary work thus far accomplished has given the construction company cause for optimism, as the subsoil has been found to be clay and sand, a favorable base. Representatives of the company have been sent to New York for a personal study of construction work. They are favorably inclined toward American machinery and will, so far as possible, limit their purchases to American products. It would therefore seem that American manufacturers of every sort of subway or tunnel-making machinery should consider the Tokyo subway as a possibility to be developed within the next two or three years.

Tenders Invited.—The Chinese Eastern Railway Administration invites tenders for the supply of 450 tons sheet iron roofing, also for a number of door and window accessories.

Inauguration of Chenkartung-Beiyuantailai Railway.—According to report, one-third of the construction work on the new line from Chenkartung to Beiyuantailai, Fengtien, has been fully completed, the remaining work having been carried on steadily. Being anxious to give facilities to communications at an early date, the railway authorities have decided to open to traffic the section already finished sometime in September.

Possible Loan of Y.25,000,000 by The Chinese Eastern Railway Reported.—Mr. Hayakawa, president of the S.M.R. Company, is inclined to loan twenty-five million yen to the Chinese Eastern Railway Co.

Coal Mining Co. Building Light Railway.—Chang Shun Coal Mining Co., Shanghai, established in 1913 with a capital of $2,200,000, has its mineral property at Sze-mow-tung in Huh-cheeshang of Chang-shun-hsien, Chekiang. The mine covers an area of more than 40 square *li* and up to now two seams have been proved with a depth of from 4-ft. 5-in. to 5-ft. and 7-ft. 5-in. to 8-ft. respectively. As estimated by mining engineers, its output—excellent bituminous coal—will be increased year after year and the supply is not likely to be exhausted within one hundred years.

The company, however, has experienced much difficulty in transportation of coal to the distributing centre, the mine being located in a deserted region. As a means to overcome the difficulty, it has been decided at its last committee meeting that a light railway will be built from the mineral district to Wu-li-jao, a distance of 50 *li*. According to estimate, the construction of the railway will call for an expenditure of $500,000, and rolling stock and other equipment will cost at $300,000. Work is reported to have already started.

New Supply to Peking-Mukden Railway.—As soon as approved by the ministry of communications, the Peking-Mukden Railway Administration will place an order with Mitsui Bussan Kaisha for supply of 25,000 rail sleepers, 2,420 side-track sleepers and 7,500 bridge sleepers.

Passenger Car to be Equipped with Machine Guns.—As a protest against robbery of trains by brigands, which repeatedly occur along the Tientsin-Pukow line it is reported that the communication authorities are contemplating to put two machine guns and police on every train.

Immediate Construction of Shaoshing-Shoshan Railway Requested.—Mr. Chen Liang-shih, a native of Chekiang, has submitted a petition to the ministry of communications, requesting to carry out the construction work of Shaoshing-Shoshan Railway, Chekiang, which was planned to be built years ago and has been suspended on account of financial shortness.

Prospect of Tube Railway for Calcutta.—The *Englishman* understands that Mr. Ogilvie, who had been deputed by Mr. Dalrymole Hay for the government to make an enquiry into the possibility of having tube railways in Calcutta, has now completed his survey and left India for home. His report is to be issued shortly. It is understood that from an engineering point of view it is quite feasible to have tube railways in Calcutta. The only consideration now is a financial one, whether the initial sum of money needed in order to inaugurate the service can be raised. The project is not a municipal one, but is in the hands of government. Mr. Ogilvie's survey was for the purpose of collecting data locally regarding the soil, temperature, prices, depth of the Hughli, possible routes, connections with railways and tramways and sites for stations.

The Light Railway Along the Yalu River.—The civil governor of Fengtien has instructed the Taoyin of the eastern prefecture of Fengtien to make preparations for the construction of the proposed light railway along the Yalu River. The work is estimated at $10,000,000, one half of which is to be subscribed by the officials while the other half is to be subscribed by the citizens.

Signal Station on Peking-Suiyuan Railway.—It is reported that the Peking-Suiyuan Railway is planning to establish a signal station at Ning-yuan at an estimated cost of about $46,300.

Inauguration of Peking-Suiyuan Railway.—On September 19 there will be observed at Suiyuan the inauguration ceremony of the Peking-Suiyuan Railway which was opened to traffic last May. This railway, whose main line measures 1,213 *li* with a branch line of 122 *li* was constructed exclusively by Chinese and purely out of Chinese money.

Szepingchar-Taonan Railway.—About eight-tenths of the Chencharteng-Peiyingtailai section, which measures 72 miles, on the Szepingchar-Taonan Railway has been fully completed; and service from Chenchairteng to Dahling will commence on November 1, 1921, while the section from Dahling to Peiyingtailai viâ Men-lienying and Pa-si will probably be opened to traffic at the end of the year. The building of remaining section from Peiyingtailai to Taonan measuring 140 miles on this long-projected Szepingchar-Taonan Railway will be continued next year.

Railway College Proposed by Warlord Chang.—Gen. Chang Tso-lin, inspector-general of the eastern three provinces, has decided to establish a railway college somewhere in Manchuria for educating railway experts for the service of the Chinese Eastern Railway.

Peking-Suiyuan Railway to be Extended to Ningsia.—The ministry of foreign affairs has suggested to the ministry of communications, that, owing to the absence of communications in north-west China, progress in the construction of the north-western railway should be made as soon as possible. It is reported that the ministry of communications has received his suggestion favorably, and is now considering a plan for the extension of the Peking-Suiyuan Railway from Suiyuan to Ningsia.

S.-N. Railway Building Side-Tracks at Nanking and Woosung.—In order to meet the increasing demand of transportation service by the Chang Shun Coal Mining Co., which has recently obtained a new mining concession. The Shanghai-Nanking Railway Administration has decided to build side-tracks at Nanking and Woosung and accommodate a designated lot of land for storing of coal upon rent, and also to build a wharf at Nanking and one at Woosung at an estimated cost of $65,000 and $60,00 each. When these facilities are completed, an increase of $250,000 for freightage on transport of company's coal can possibly be made every year.

1921 Railway-Building Program Progressing: Japan.—Railway construction in Japan is announced by the department of railways to be going on satisfactorily. The present financial year's program includes the laying of new lines, 260.8 miles in length, of which 104.7 miles have already been laid and are open to traffic.

The present financial year's construction program includes no trunk lines, and in the scale of importance it stands lower than the repair or improvement plan. But the mileage of the new lines to be laid is pretty large totaling 260.8 miles. According to an announcement made recently by railway authorities, the construction thus far has been up to expectations.

Very shortly two more sections will be completed, the total mileage being 23.6 miles. One of these is the Hamada-Namiko section of the Hamada Line in Fukui prefecture. This line will be completed soon. The other is the last section of the Ono Line, 14.5 miles in length. It will be opened to traffic about September 11.

The rest which are still in construction are 16 lines or sections, 132.5 miles. The department of railways plans to complete them by next March.

Big Order of Steel Rails for a British Firm.—Messrs. Baldwins, Limited, have secured an order for 17,000 tons of steel rails for China.—*Reuter.*

Replacement of Rails on S. M. R. Co. Line.—Referring to the replacement of rails and the double-tracking work on the main line of the S. M. R. Co. Manchuria Lines, Mr. J. Fujine (superintendent, the railway office) says to the following effect :—

At present the rails of the S. M. R. Co. Manchuria Lines consist of 180 miles of 100-lb., about 700 miles of 80 lb., and some 600 miles of 64-lb. It is on the cards that a section covering 180 miles shall have its rails replaced with 100 pounders. The rails ordered from abroad indirectly are arriving in succession. The price of rails is about Y.130 per ton, costing about Y.20,000 per mile in rails alone. There was, however, a time when 1 ton of rails cost Y.200.

The durability of rails varies according to the quality of rails and the locality in which the rails are laid. But in the present condition of the S.M.R. Co. Manchuria Lines, it may be safely put at 60 years. This refers to the main line, on which the heaviest traffic is carried on. The old rails are available for constructing sidings in some railway station yards.

As regards sleepers, Hokkaido timber has been in extensive use hitherto. Lately Kirin timber has come to be also used. The durability is about six years.

The Railway Company maintains a timber creosoting plant at Suchiatun south of Mukden, where the creosote obtained from the dregs left after extracting coal tar at Fushun Collieries is applied to the timber as preservative. By this means, the durability of the timber can be extended to about fifteen years.

In the present fiscal year, the work of doubling the track north of Tiehling up to Kaiyuan will be taken up.

A Railway System.—The Cantonese government has under consideration the question of linking up, by railways, the two frontier provinces included in the south-west federation, which is now a reality in name and in fact since the fall of Nanning. It is intended to construct a great trunk-line from Canton to Chungking in Szechuan and another from Canton to Yunnanfu, the capital of Yunnan. The most difficult section of the latter line has been surveyed, i.e., the section from Yunnan to Kuangsi, the rest of the line following level ground. Besides the construction of these trunk routes, there is good reason to hope that the completion of the Canton-Hankow railway will soon be taken in hand.

The construction and operation of these three trunk roads will, it is expected, transform Canton and make it one of the greatest trading centres in the world. The Canton-Chungking railway, for instance, will tap the biggest and richest province of China with an area as large as Germany and a population equal to the combined population of France and England, and resources that are truly continental in scale. And it may be noted that for the present and for many years to come, Hongkong must be the ocean port of Canton.

Order for Steel Rails.—The Peking government has ordered from the United States Steel Products Company 17,000 tons of steel rails for the Peking-Suiyuan Railway.

British Offer Loan to Help China Buy Railway Rolling Stock.—The ministry of communications has submitted a proposal to contract a short-term loan with the British-Chinese Corporation for the purchase of rolling-stock for the Hunan-Hupeh section of the Szechuen, Canton and Hankow Railway. It is understood that this suggestion has been favorably received.

Military Governor of Heilungkiang to Build a Railway.—As the opening of Ma-kar-zai-kow, north of the Sungari river, as a commercial port, will certainly enhance its industry and commerce, the tuchun of Heilungkiang intends to raise a fund of $4,000,000 from the public works department for the construction of a railway from Harbin to Heilungkiang.

Construction of Light Railway Affected by Flood.—As a result of the flood at Hu-chow, Kiangsu, the construction work of the light railway from Hai-chee to Wu-lee-jao, Huchow, has been suspended, a lot of rails and sleepers having been destroyed. The railway is being built for the Chang Shun Coal Mining Co. at an estimate cost of about $90,000.

Chinese Eastern Railway and South Manchuria Railway May be United in Transportation Service.—According to reports, negotiations are proceeding between the Chinese Eastern Railway and the South Manchuria Railway for through transportation service. The proposal is said to be mutually agreed upon by both parties and Mr. Sung Sho-lien, director of Chinese Eastern Railway, has recently made a report to the government regarding the result of the negotiations.

A Further Purchase of Cars.—There is another contract concluded between the Railway Car Loan Chinese Banking Group and the Fearon, Daniel Co. for the supply of 40 40-metric ton all steel covered wagons for the Shanghai-Hangchow-Ningpo Railway. The text reads the same as the former one for the Tientsin-Pukow Railway, only with the following alterations :—

Wagons 40 in number at the price of B.F. 32,260 per complete wagon, for goods delivered c.i.f. Woosung, excluding customs duty and all other dues.

The Railway administration's inspecting engineer is Mr. Palai.

Prolongation of Light Railway, Nantungchow.—With reference to the lengthening of the light railway owned by Dah Sung Cotton Mill, Nantungchow, work has been commenced. When completed the whole line will measure 13 *li* in length and will reach Tsing-lung-kong direct from the cotton mills.

Improvement Work on Peking-Mukden Railway.—Tht Peking-Mukden Railway brings in yearly an average nrt profit ot over $10,000,000 which stands first among the government railways, and improvement work on it is carried out almost all the time. While the extension work from Sze-tao to Jehol is still under way, another scheme for double tracking a distance of about 30 *li* starting from Ching-chow is under contemplation.

New Work on Tientsin-Pukow Railway Approved.—The proposal of the Tientsin-Pukow Railway Administration for enlarging the No. 1, 2 and 4 railway warehouses at Pukow to be covered with strong roofs at an estimated cost of $50,000 has received approval of the ministry of communications.

The railway administration has also been permitted by the chiaotungpu to purchase 1,500 tons of pitch to coat the sleepers for preservation.

A Chinese Railway Sleeper Factory.—Most of the railway sleepers on Chinese railways are imported from abroad and an enormous amount for this has gone to foreigners' hands every year. The ministry of communications has raised a fund for the establishment of the Government Railway Sleepers Factory.

Materials for Szechuen Railway Ordered from Shanghai.—Mr. Wang, representative of the Tze-liuting-Foochen Railway, Szechuen, under projection, has lately come to Shanghai for the purchase of a lot of railway materials from the Tsin Chang Engineering Works.

PUBLIC WORKS

Public Works, Nantungchow.—The removal of Nantungchow city walls is approaching completion and the construction department is ready to build a market on the old foundations and to construct some modern roads inside the city which will necessitate pulling down some old buildings which prove to be an obstruction to carrying out the scheme.

RIVERS, HARBORS, WHARVES AND DOCKS

New Pier for Hongkong.—Tenders are being called for the construction of a reinforced concrete public pier, 160 feet 8 inches long by 41 feet 4 inches wide, and approach, at Queen's Statue Square, Hongkong.

Preparatory Offices for Haichow Harbor Works, Kiangsu.—It has been decided that pending the establishment of Haichow Harbor Works Office which will be appointed when survey of the port and other preliminary arrangements have been completed, a preparatory office will be organized at Nanking to take charge of preparatory works of the scheme.

Kiang-Ngan to be Opened as a Commercial Port.—The construction of Kiang-ngan as a commercial port near Hankow, Hupeh, has been decided to be taken up by the ministry of communications, and survey and investigation of the port is being carried on by engineers. Six hundred *mow* of land will be reserved for constructing modern roads and building a new market.

Plant for the Han-Yeh-Ping Co.—Designs of coal handling plant which has been built by Messrs. Horace Greaves & Co., Ltd., of Derby, for discharging boats at the staith on the Yangtze River, and delivering coal to the bunkers at the coke ovens, the boilers, and other parts of the works have been examined recently. The task set the designers was far from easy. The plant when fully loaded was to be capable of handling 200 tons of washed slack per hour in discharging boats from the River, has a difference in water level between the wet and dry seasons of no less than 40 feet. The plan of unloading by grab had to be discarded because the washed slack, although drained, would contain sufficient moisture to make it plastic. This would mean that the grab to be of service would have to be dropped into the material, which might well result in damaged grab or boats. The way out of the difficulty was found by a specially-designed dredger working in conjunction with a system of conveyers. The plant is a fine piece of constructional work, the mechanical portion being equally sound alike in conception and disposition.

Hsiang-Shan to Build a Wharf.—With a view to affording facilities to the steamers frequenting Hsiang-shan, Chekiang, Mr. Hus Ming-jen, with the support of the local magistrate Mr. Li Bai-tser, has formulated a plan for the building of a wharf at Bei-tung. The expenditure is estimated at something like $10,000, and solicitation of subscription among the public for the purpose has been begun.

ROADS

Chefoo-Weihsien Road.—The work on this road was started on September first of last year and will be finished shortly. Within a period of eleven months approximately 3,000 refugees have been given employment and a total mileage of 650 has been completed. The total expenditure of famine relief funds has been $850,000. The road for motor transportation purposes is to be divided in twenty sections, each section having a station, and the stations being separated into three classes. The expense of establishing the stations and purchasing the necessary equipment is estimated at $600,000.

Proposal of Anhwei-Chekiang Automobile Road.—With a view to facilitating communications and improving means of transportation, Mr. Wu Tien-ching and several others have proposed the construction of the Anhwei-Chekiang Automobile Road. In Chekiang the terminus of the line will be at Yuehong and its Anhwei terminus at Teng-chee, and the whole line, when completed, will measure about 300 *li*. A survey has been made.

An Automobile Transportation Co. in Southern Fukien.—Several Fukien officials have associated themselves with the local gentry and merchants for planning the organization of Sze Shun Automobile Transportation Co. to run a service on the newly-built provincial roads and also on roads being built and to be built. At the outset, Chong-chow will be chosen as the central station, leading to Shih-mar on the south-east, a distance of 35 *li*; to Tien-pao-hsu on the north-east and turning westward to Nan-zing-chen, 35 *li*, and to Nan-hsu on the north then turning eastward to Chang-tai-chen, 30 *li*, aggregating 100 *li* in length. Transportation service from Chong-chow to Mar-kow-jao via Feng-jen-mue, a distance of 35 *li* and from Feng-jen-mue to Chenchee, 10 *li* is also under contemplation.

Roads to be Well Paved, Tongshan.—Neglect in public work has made Tongshan, Chihli, imperfect in some degree, though on the other hand the town has made remarkable progress in industry and commerce. With a view to improving the existing conditions, Mr. Liu Tze-tseng has decided to have the Tongshan roads well paved. The plan involves the construction of a line of 1,300,000 sq. ft. to cost $10,000. Permission has been obtained from the provincial authorities and work will be carried out in the near future.

Road Construction, Nantungchow.—Except the recently built Museum Road, all the roads in the southern part of Nantungchow are in a bad condition and very narrow. In order to facilitate communications, the road construction department has commenced to have all the narrow paths macadamized and extended in width by 10 feet so as to afford enough space for running motor-cars.

Haining-Changanchin Automobile Road, Chekiang.—The automobile road from Hai-ning to Changanchin, Chekiang, which measures 26 *li*, has been surveyed by Mr. Yue Shao-foo, the engineer. According to estimates, a profit of about $50,000 can possibly be made every year from the autobus service to be run on the road.

Road Construction, Hsuchow.—While the two roads leading direct from the railway station of the Shanghai-Nanking line to Tung-men and Nan-men respectively in Hsuchow have been completed, the construction of the second and third roads, which have been under projection for some time, will be started soon, and the local magistrate has notified the public to that effect.

Chekiang-Anhwei Automobile Road is being Surveyed.—With reference to the construction of an automobile road from Chekiang to Anhwei via Hangchow, Yue-hong, Yue-chien, Chang-hua, Shih-hsien, Tsi-chee and Shu-ning, proposed by Mr. Wu Chang-yung, a prominent merchant of Shu-ning, Anhwei, the sanction of provincial authorities has been secured, and survey of the projected line is being carried on by Mr. Chong Lu with two assistant engineers.

Woosung Military Road Planned.—In order to facilitate military transport, Yung Dao-yih, a military officer in Woosung, has decided to construct a military road from the Bay of Woosung Fort to Sze-tze-ling, a distance of about 20 *li*.

Plan of China National Roads Construction Society.—Since its establishment the China national roads construction society is endeavoring to carry out the scheme for construction of Shanghai-Nanking-Hangchow motor-road. At request of Dr. C. T. Wang, chairman of the society, General Lu Yung-hsiang, tuchun of Chekiang, has consented to send a body of soldiers to render their services in building of Shanghai-Hangchow line, and the work is expected to start before long.

SHIPBUILDING

Slump in Shipbuilding, Japan.—The shipbuilding industry is now apparently at its worst. The department of agriculture and commerce reports only five vessels of 1,000 gross tons or more launched in May. The Uchida Shipyard at Yokohama has been sold to the Osaka Iron Works which is in turn connected with the Osaka Shosen Kaisha. The yard has been closed except for the completion of one steamer now building. The future policy of the new company, to be named the Yokohama Iron Works, will be determined later. It is rumored that the Yokohama Dockyards will soon pass to the entire control of the Nippon Yusen Kaisha, which now owns a majority of the company stock.

Vessels tied up in Japan are slowly being releaesd. The decrease thus far is in small ships used in the coasting and near-sea trade. In foreign trade there is a decrease in arrivals and departures. This decrease is especially noted in foreign shipping, particularly American, which has given way to Japanese lines.

Launch of a Steel Motor Lighter.—A steel single-screw motor-propelled lighter to carry about 200 tons deadweight and to have a speed of 9 knots, built to the order of Holt's Ocean Steamship Co., was launched from the Kiangnan dockyard recently.

The vessel is to be propelled by Campbell oil engines of 160 B.H.P., operating on kerosene oil.

This lighter is the first vessel of the type built for service in this harbor, where freight is usually loaded into barges and then towed to the point of discharge. The self-propelled lighter will no doubt gradually supersede the old method of transport of freight in and about this harbor and Woosung.

SHIPPING

Good Port for American Shipping.—In a letter on American trade conditions in Indo-China Consul MacVitty states that Saigon is proving one of the surest cargo ports for American shipping in the East. There was recently more cargo there than could be handled by the present shipping facilities. Shipping agents say they can secure better rates at other ports, but it is believed that the rate question will shortly improve, and in that case Consul MacVitty thinks it would be worth while to allot a larger amount of shipping to Saigon.

Orders for Three Steamers Placed with Local Docks.—Tenge & Co., the Japanese steamship company of which Kaiyosha Co., 5 Canton Road, are agents, have placed orders with the Kiangnan and the Mitsubishi Docks for the construction of three steamers for the Ichang-Chungking run at a cost of about Tls. 1,200,000. The steamers will be launched in March and immediately put to service on the upper Yangtze.

Two of these steamers will be constructed by the Kiangnan Dock, while the other has been contracted for with the Mitsubishi. All the steamers will be of uniform size, each measuring 205 feet in length, 31 feet in breadth and 17 feet deep. The boats will each be capable of a speed of 15 knots and equipped with all modern conveniences.

A New Undertaking in China.—The plan of Mr. Woo Zao-chi, a returned student from France, for organizing the Chuen-Kiang Aerial Navigation Co. at Chungking has received favorable consideration and the approval of official circles as well as the business people of Szechuen. General Liu, commander-in-chief at Chungking, has promised to set aside an amount of $150,000 for its reserve fund, and all the prominent and influential personages in Szechuen have participated in the undertaking, the most important being Messrs. Tang Tze-tsing, Li Yu-sung, Yuan Zung-wu, Li Tung-lung, Wang Yuan-sung, Kao Sur-tze and Li Bai-tze.

A Navigation Co. Under Organization, Chekiang.—Mr. Li Tsu-mai is organizing the Yah Tsi Steamship Navigation Co. at Ling-chao, Chekiang, and application for approval and registration has been made to the civil governor of Chekiang who has in turn submitted the petition to the ministry of agriculture and commerce for consideration.

Projected Steamship Service to Shanghai.—The steamship service recently started between Dairen and Tientsin by the Tenkwa Yoko, a company organized by some prominent shipowners in Tokyo and Yokohama, is reported to have proved a success. Encouraged by this departure, the company is reported to have decided to open another service to Shanghai, which is now done exclusively by the N.Y.K., using the newly-built str. *Toko Maru* (2,100 tons), the *Toyo Maru* No. 3 (2,700 tons) and the *Kisen Maru* No. 3 (2,508 tons).

Bigger Steamers Built this Year.—Investigations made by the ministry of communications show that the number of steamships of 1,000 tons and above launched from dockyards in Japan during the first six months of this year is 27 with an aggregate tonnage of 14,420. To be more particular, six with an aggregate tonnage of 37,960 were built at the Kawasaki Dockyard, four of 24,540 tons at the Yokohama Dockyard Company, four more of 9,800 tons at the Sakurashima Dockyard of the Osaka Iron Works, two each at the Asano and the Mitsu Bishi Dockyards, and one each at the Ishikawashima and eight other dockyards.

New Lighter Built at Kiangnan.—A steel single-screw motor-propelled lighter to carry about 200 tons deadweight and to have a speed of 9 knots, built to the order of the Ocean Steamship Co., was launched from the Kiangnan dockyard on September 5.

The vessel is to be propelled by Campbell oil engines of 160 b.h.p., operating on kerosene oil.

This lighter is the first vessel of the type built for service in Shanghai harbor.

Extensive Schemes Drawn up by Chinese Chamber of Commerce, Mukden.—With regard to the proposed undertakings of navigation and fishery by the Chinese chamber of commerce at Mukden with a capital of $15,000,000, it has been decided at its last meeting that $10,000,000 will be devoted to the construction of twenty steamers to operate a service at Yinkow, Antung, Tientsin and Shantung, and another $5,000,000 to purchase of some fishing steamers and organization of a fishery company to work at Yinkow, Antung, Fu-kan, Baishan, Kin-hsien and Wu-lu-tao.

TELEPHONES

A Telephone for Sale.—There is an interesting dispute between the Chinese government telephone administration and a Mr. Wu, residing in the Tsung-pu Hutung, Peking, for the latter's selling of his telephone by advertisement in the vernacular journals. This man says that he will sell or transfer his telephone to the highest bidder without the permission of the telephone administration. This is believed to be the first case in the history of the Chinese telephone service though in Japan telephones have changed hands without official sanction. Owing to the lack of machines, many people who applied for telephone connections last year are still unable to get them.

TRAMWAYS

Chinese Ask Control of Peking Tramway.—Consequent on the suspension of payment of the Banque Industrielle de Chine, which held the French shares, the board of directors of the Peking Tramway Company has petitioned the government to cancel the Sino-French agreement in connection with the formation of the organization, so that it may be converted into a purely Chinese enterprise.

The ministry of finance has appropriated $500,000 for government shares so as to enable the work to continue without interruption. The ministry of foreign affairs is negotiating with the French authorities to secure the cancellation of the agreement.

Tramway System, Fengtien.—A plan has been formulated by Mr. Chiang Sze-shih for laying down tramway tracks in Fengtien in three different routes, viz : (1) from Mukden to Yinkow, (2) from Mukden to Dairen and (3) from Mukden to Fushun, and a petition together with a set of regulations has been submitted to the local authorities for approval and registration.

Prospective Purchase of Singapore Tramways.—Without considering the report of Mr. Dyson, the expert from Rangoon, Singapore municipality will offer £190,000 sterling for the acquisition of the tramways, less the cost of putting the plant in good running order. Subject to verification, the stores are at present valued at £58,000. This is a final "take or leave" offer.

Tramway System Proposed by Japanese, Antung.—A plan has been on foot by Japanese capitalists for laying down a tramway track at Sin-tze-kar in Antung, Fengtien. The proposed line is to start from Dah-wu-jao, thence leading to the railway station and passing through the iron bridge at Kiang-ngai, and end at Dah-chongtung.

WATERWORKS

Water Supply Projects in Malay Peninsula.—There is a large project in course of development for bringing water to Singapore from the state of Johore, crossing the Straits of Johore over the Johore Straits causeway, now in course of construction, reports Trade Commissioner John A. Fowler. There is also under consideration a plan for developing a water supply in the state of Kedah. The present financial situation is delaying all public works for which money has not already been appropriated, and it is probable that actual construction will not commence for some time. The mere item of cast-iron piping for both projects will involve upward of a million dollars, and, while the call for tenders on this piping may be delayed for several years, interested American manufacturers would be well advised to watch developments, as the government is not apt to allow much time for submitting bids when tenders are invited.

Water Supply Company: Canton.—The *Canton Times* is informed by Mr. J. Ormistang, engineer in charge of the Anglo-Chinese Engineers' Association, Ltd., that the complete new plant for the Water Supply Company was landed in Hongkong in the early part of this month. This include one pump only.

Extension of Shanghai Native Waterworks Co.—The Shanghai Native Waterworks Co. has completed the installation of large pipes from Dah-nan-men to Sin-pei-men; and a similar work from the site of the company to the suburb of Nan-men will be carried out soon. It is reported that the company has ordered from abroad an up-to-date pumping machine which will arrive in Shanghai in October.

Capitalization of the Proposed Nanking Waterworks.—At a meeting held at the Nanking municipal council on September 12 under the chairmanship of Mr. Liu, general-staff of the Kiangsu tuchun, it was officially decided that the capitalization of the proposed waterworks at Nanking should be $1,200,000 in 60,000 shares of $20 each.

WIRELESS

China's Wireless Station.—A greater part of the wireless stations established in China are owned by foreigners, those owned by the ministry of communications being only eight in number. They are in Peking, Kalgan, Wuchang, Foochow, Woosung, Canton, Zungming and Shanghai. Besides these, there are three others belonging to the ministry of war established in Peking, Tientsin and Paoting, while another controlled by the ministry of navy at Tungchow has not been opened to service yet.

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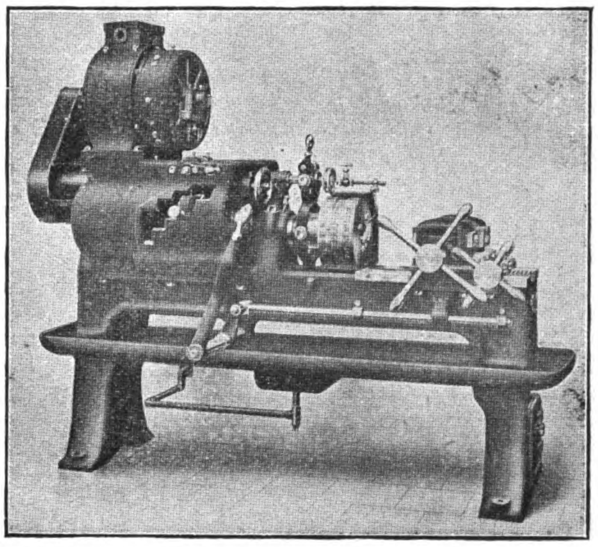

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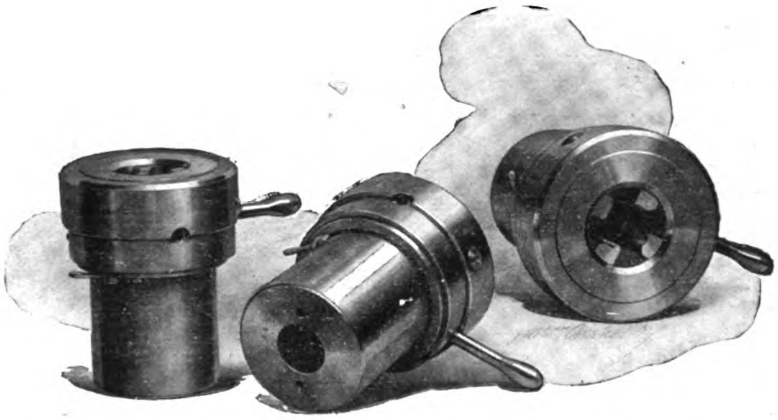

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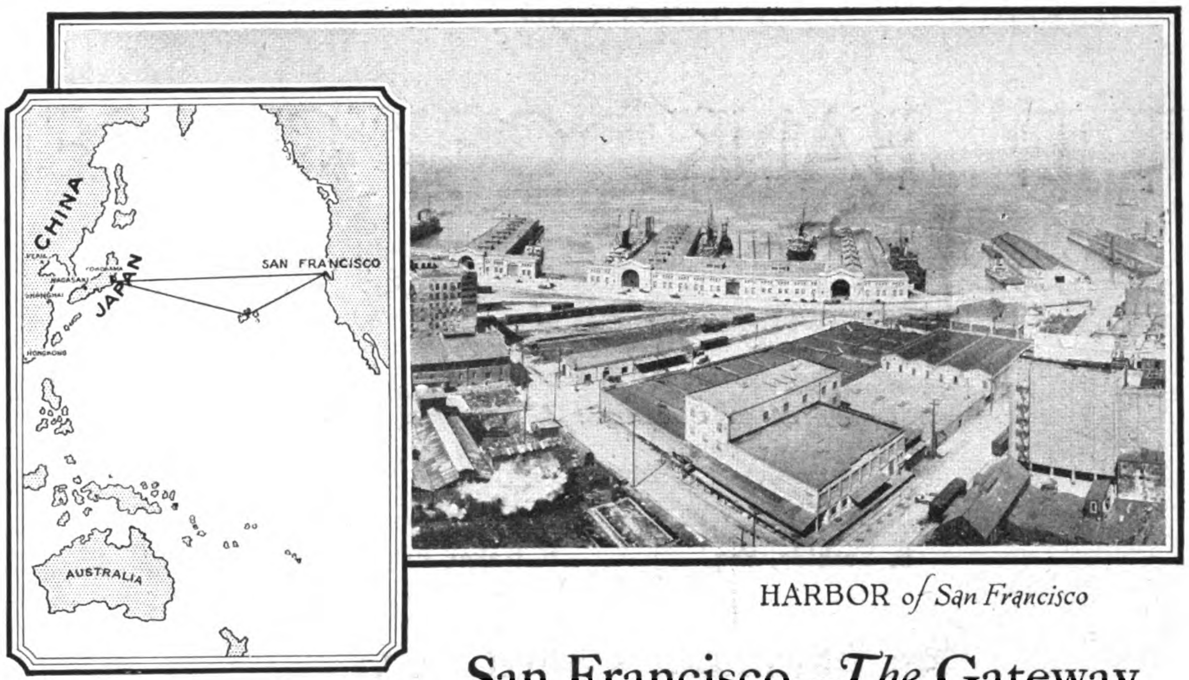

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624 Branches in Canada and Newfoundland, also

107 FOREIGN BRANCHES.

ARGENTINE Buenos Aires.

BRAZIL Rio de Janeiro, Santos, Sao Paulo.

URUGUAY Montevideo.

VENEZUELA Caracas, Ciudad Bolivar. Maracaibo.

COLOMBIA Barranquilla.

COSTA RICA San José.

WEST INDIES

CUBA—Havana (8 Branches), Antilla, Banes, Bayamo, Caibarien, Camaguey, Camajuani, Cardenas, Ciego de Avila, Cienfuegos, Cruces, Cueto, Florida, Guantanamo, Jatibonico, La Maya, Manzanillo, Matanzas, Moron, Nuevitas, Palma Soriano, Pinar del Rio, Puerto Padre, Sagua la Grande, Sancti Spiritus, Santa Clara, Santiago de Cuba, and at nineteen other points.

PORTO RICO—San Juan, Mayaguez and Ponce. **HAITI**—Port-au-Prince.

DOMINICAN REPUBLIC—S. Domingo, La Romana, Puerto Plata, Sanchez, S. Pedro de Macoris and Santiago de los Caballeros.

MARTINIQUE—Fort de France, Trinité.

GUADELOUPE—Pointe-à-Pitre and Basse Terre.

BRITISH WEST INDIES — Antigua, Bahamas, Barbados, Dominica, Grenada, Jamaica, Montserrat, Nevis, St. Kitts, Trinidad and Tobago.

BRITISH GUIANA—Georgetown, New Amsterdam, &c.

BRITISH HONDURAS—Belize.

CAPITAL PAID UP & RESERVES $40,000.000
TOTAL RESOURCES - - - $550,000.000

THE
BANK OF TAIWAN LTD.

INCORPORATED BY SPECIAL IMPERIAL CHARTER, 1899

Capital Subscribed - - - - - - -	Yen 60,000,000
Capital Paid-up - - - - - - - -	,, 45,000,000
Reserve Funds - - - - - - - -	,, 9,680,000

President: KOJURO NAKAGAWA, Esq. **Vice-President: SHUNROKURO MORI, Esq.**

DIRECTORS:

TSUNEKICHI IKEDA, Esq.
GUNJI KAWASAKI, Esq.
KUMEMATSU MORINAGA, Esq.
MASUMI ESAKI, Esq.
TADASU HISAMUNE, Esq.

***Head Office:* TAIPEH, FORMOSA (TAIWAN)**

BRANCHES:

JAPAN: Tokio (General Affairs Department), Kobe, Moji, Osaka, Yokohama.
TAIWAN: Keelung, Tainan, Takow, and 11 other points.
CHINA: Amoy, Canton, Foochow, Hankow, Kiukiang, Shanghai, Swatow.
OTHERS: Bangkok, Batavia, Bombay, Hongkong, London, New York, Semarang, Singapore, Soerabaya.

AGENTS AND CORRESPONDENTS:

In the Principal Cities and Towns throughout the World.

LONDON BANKERS:

BARCLAYS BANK, LTD. LLOYD'S BANK, LTD. LONDON COUNTY WESTMINSTER & PARR'S BANK, LTD.

TOKYO BRANCH:

No. 1, Eiraku-cho Ni-chome, Kojimachi-ku.

Telegraphic Address: "TAIWANGINK."

Phone Nos. 1060, 1061, 1062, 1063, 1064, 1065, 1066, 446, 447, 448 and 449, Marunouchi.

Interest allowed on Fixed Deposits, and Current Accounts on terms which may be ascertained on application. Most favourable terms are granted for Petty Current Accounts.

Every description of Exchange and General Banking business transacted.

Special facilities are available for exchange business on China, Straits Settlements, East Indies, Australia, Great Britain, Russia, America, Canada, South Africa, etc.

Industrial Bank of Japan, Limited

(NIPPON KOGYO GINKO)

Incorporated by Special Charter in 1902 to Encourage Foreign Investments

CAPITAL SUBSCRIBED - - - - -	Yen 50,000,000
CAPITAL PAID-UP - - - - - - -	Yen 45,000,000

HEAD OFFICE:
MARUNOUCHI, TOKYO. CABLES "KOGIN," TOKYO

BRANCHES:
TOKYO: NIHONBASHI
OSAKA: KORAIBASHI
KOBE: NAKAMACHI

H. HIJIKATA, Esq., President
Y. ONO, Esq., Vice-President
K. IYANAGA, Esq., Director
T. IWASA, Esq., Director
KOZO MATSUMOTO, Esq.

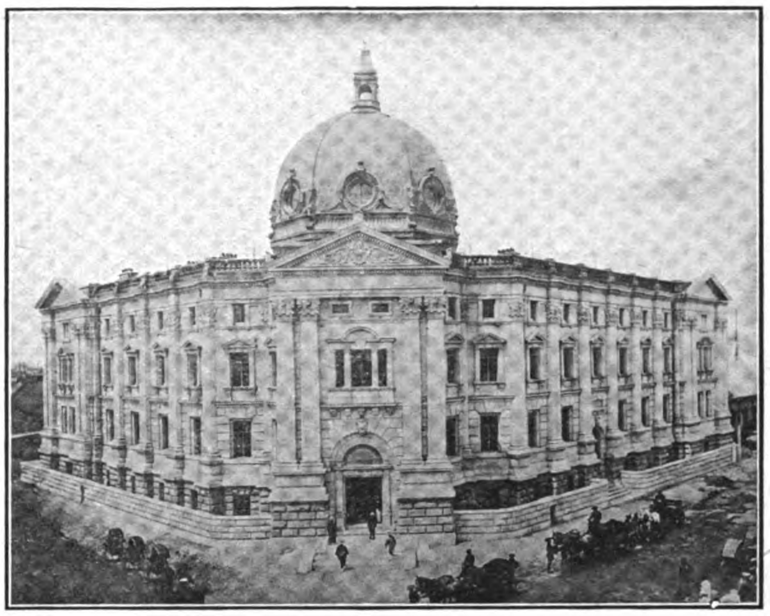
AUDITORS:
NAGATANE SOMA, Esq.
KINTARO HATTORI, Esq.
KINICHI KAWAKAMI, Esq.
TAICHI OHBA, Esq.

All descriptions of general banking, exchange, both foreign and domestic, and trust and corporation financial business transacted.

Correspondents in the principal cities at home, and in London, Paris, New York, and San Francisco.

BUSINESS TRANSACTED:

1.—Loans on the security of public bonds of debentures and shares, estates (Zaidan), specified land and buildings.
2.—Subscription and underwriting public bonds or debentures.
3.—Deposits and safe custody of valuables.
4.—Trust company business.
5.—Discounting of bills.
6.—Foreign exchange business.
7.—Other banking business sanctioned by the Minister of State for Finance in accordance with Law of Ordinance.



HEAD OFFICE, YOKOHAMA

Capital (Fully Paid-Up): Yen 100,000,000

Reserve Fund: Yen 57,000,000

CORRESPONDENTS AT ALL THE CHIEF COMMERCIAL CITIES IN THE WORLD

The Yokohama Specie Bank, Ltd.

Established 1880

DIRECTORS:

President: NAKAJI KAJIWARA, Esq.
Vice-President: SHIMAKICHI K. SUZUKI, Esq.
NAGATANE SOMA, Esq.
YUKI YAMAKAWA, Esq.
MASNOSKE ODAGIRI, Esq.
BARON KOYATA IWASAKI
KONOJO TATSUMI, Esq.
FUKUSABURO WATANABE, Esq.
IWAO MATSUKATA, Esq.
MORINOSUKE MITSUI, Esq.
BARON KAISAKU MORIMURA
REITARO ICHINOMIYA, Esq.
KENJI KODAMA, Esq.
KIMPEI TAKEUCHI, Esq.
TARO HODSUMI, Esq.

Head Office: YOKOHAMA
Manager: H. MORI, Esq.

TOKYO BRANCH
No. 1, Itchome, Eirakucho, Kojimachi-ku.
Manager: K. MOGAMI, Esq.

BRANCHES AND AGENCIES.

Batavia	Dairen	Hongkong	Los Angeles *(sub-office of San Francisco Branch)*	Nagoya	Rangoon	Shanghai	Tientsin
Bombay	Fengtien	Honolulu	Lyons	Newchwang	Rio de Janeiro	Shimonoseki	Tsingtau
Buenos Aires	Hamburg	Kaiyuang	Manila	New York	Saigon	Singapore	Tsinan
Calcutta	Hankow	Kobe	Nagasaki	Osaka	San Francisco	Sydney	Vladivostock
Changchun	Harbin	London		Peking	Seattle	Sourabaya	

LONDON BANKERS

LLOYD'S BANK, LIMITED
LONDON COUNTY WESTMINSTER AND PARR'S BANK, LIMITED
NATIONAL PROVINCIAL AND UNION BANK OF ENGLAND, LIMITED
LONDON JOINT CITY AND MIDLAND BANK, LIMITED

Interest allowed on Current Accounts and Fixed Deposits on terms to be ascertained on application.
Every description of Banking business transacted.
For particulars, apply to the managers.

THE FIRM OF SUMITOMO

OWNERS OF BESSHI COPPER MINE, COAL MINE, ETC.

MANUFACTURERS OF

Tubes, Plates, Sheets and Bars of Copper Brass, Bronze and other Copper Alloys, Solid Drawn Steel Tubes, Nails, Electric Wires and Cables, Artificial Fertilizer, etc.

WORKS AND DEPARTMENTS

General Head Office	Osaka	Tokyo Sales Department	Tokyo
Besshi Copper Mine Office	Niihama, Iyo	Kure Sales Department	Kure near Hiroshima
Copper Sales Department	Osaka & Kobe	Yokosuka Sales Department	Yokosuka
Warehouses	Osaka, Kobe & Toyko	Hakata Sales Department	Hakata
Wakamatsu Coal Department	Wakamatsu, Chikuzen	The Sumitomo Yoko	Shanghai
Copper Works	Osaka & Amagasaki	The Sumitomo Yoko	Hankow
Electric Wire and Cable Works	Osaka	The Sumitomo Yoko	Tientsin
Fertilizer Manufactory	Niihama, Iyo	The Sumitomo Bank of Hawaii	Honolulu
Sapporo Mine Office	Sapporo, Hokkaido	The Sumitomo Bank of Seattle	Seattle

THE SUMITOMO STEEL WORKS, LIMITED

OSAKA, JAPAN

President: Baron K. SUMITOMO

MANUFACTURERS OF

Steel Ingots, Steel Forgings, Steel and Iron Castings of every description for Railways, Shipbuilding Yards, Mines, Hydraulic, Electric and other Engineering Works, etc. etc.

THE SUMITOMO BANK, LIMITED

OSAKA, JAPAN

Cable Address: "SUMITBANK"

President: Baron K. SUMITOMO

Capital Subscribed	Yen 70,000,000	Reserve Fund	Yen 12,000,000
Capital Paid-up	„ 40,000,000	Deposits (30th June, 1920)	„ 360,000,000

HOME BRANCHES:

Tokyo, Yokohama, Nagoya, Kyoto, Kobe, Hyogo, Onomichi, Niihama, Kure, Hiroshima, Yanai, Shimonoseki, Moji, Kokura, Wakamatsu, Hakata, Kurume.

FOREIGN OFFICES:

New York, San Francisco, Shanghai, Hankow, Bombay, London, Seattle (Affiliated Bank), Hawaii (Affiliated Bank).

AGENTS:

National City Bank of New York, New York. Lloyd's Bank Ltd., London.

The Bank buys, sells and receive for collection Drafts and Telegraphic Transfers, issues Commercial and Travellers Letters of Credit available in all important parts of the world, besides doing general Banking business.

THE

MITSUBISHI BANK,

LIMITED

CAPITAL SUBSCRIBED - Yen 50,000,000
CAPITAL PAID-UP - - - Yen 30,000,000

PRESIDENT:

Baron Koyata Iwasaki

MANAGING DIRECTORS:

Mr. Manzo Kushida Mr. Mikitaro Kikuchi
Mr. Kiyoshi Sejimo Mr. Takeo Kato

HEAD OFFICE:

No. 1 Yayesucho Itchome, Kojimachi-ku,
Tokyo, Japan.

BRANCH OFFICES:

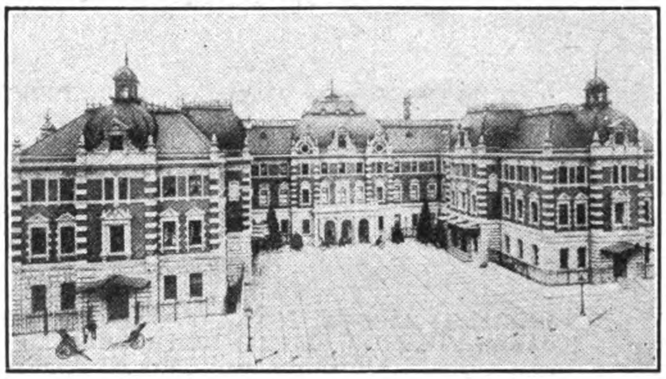
Fukagawa (Tokyo), Marunouchi (Tokyo), Nihombashi (Tokyo), Osaka, Nakanoshima (Osaka), Kobe, Kyoto, Nagoya, Shanghai, New York and London.

General Banking and Exchange Business

Agents for Hongkong and Shanghai Banking Corporation

THE MITSUI BANK, LTD.

The Oldest Bank in Japan, Founded in 1673



Capital Subscribed... ....Y. 100,000,000.00
Capital Paid-Up.....................Y. 60,000,000.00
Reserve Fund (July 1921)......Y. 28,000,000.00

HEAD OFFICE:

No. 1 Suruga-cho, Nihonbashi-ku,
TOKYO

BOARD OF DIRECTORS:

GENYEMON MITSUI, Esq. (*President*); SEIHIN IKEDA, Esq., UMEKICHI YONEYAMA, Esq., NAOJIRO KIKUMOTO, Esq. and OTOHIKO MAJIMA, Esq. (*Managing Directors.*)

MORINOSUKE MITSUI, Esq., TOMITARO HARA, Esq., KANETARO KISHIMOTO, Esq., HIROKICHI KAMESHIMA, Esq. and KIKUSABURO FUKUI, Esq. (*Directors*).

Branches:

FUKAGAWA (Tokyo), HAKOZAKI (Tokyo), OTARU, YOKOHAMA, NAGOYA, KYOTO, OSAKA, NISHI (Osaka), KAWAGUCHI (Osaka), NAKANOSHIMA (Osaka), KOBE, HIROSHIMA, SHIMONOSEKI, MOJI, WAKAMATSU, FUKUOKA, NAGASAKI, SHANGHAI.

Foreign Agents:

London: Barclays Bank, Ltd.
London Joint City & Midland Bank, Ltd.
New York: The National City Bank of New York.
The Chase National Bank.
Bankers Trust Co.
Paris: Banque de l'Union Parisienne.
Comptoir National d'Escompte de Paris.
Bombay: National Bank of India, Ltd.

THE DAI-ICHI GINKO, LTD.

(FORMERLY THE FIRST NATIONAL BANK)

ESTABLISHED 1873

Subscribed Capital - - -	Yen 50,000,000.00
Paid-Up Capital - - - -	Yen 29,525,000.00
Reserve Fund - - - -	Yen 29,500,000.00

Y. SASAKI, *President*

K. ISHII, *Managing Director.* Y. NOGUCHI, *Managing Director.* S. SUGITA, *Managing Director.*

HEAD OFFICE:
No. 1 KABUTO-CHO, NIHONBASHI-KU, TOKYO.
T. AKASHI, *Manager*

CITY BRANCHES:
ISECHO, SHIN-OSAKACHO, FUKAGAWA, MARUNOUCHI.

HOME BRANCHES:
YOKOHAMA, NAGOYA, YOKKAICHI, KYOTO, NISHIJIN (KYOTO), GOJO (KYOTO), FUSHIMI, OSAKA, NISHIKU (OSAKA), MINAMIKU (OSAKA), HONMACHI (OSAKA), KOBE, HYOGO, HIROSHIMA, SHIMONOSEKI, CHOFU, MOJI, FUKUOKA, KURUME, KUMAMOTO, HAKODATE, OTARU, SAPPORO, MURORAN.

BRANCHES IN COREA:
SEOUL, FUSAN.

LONDON & NEW YORK BANKERS:

London: London County Westminster & Parr's Bank, Ltd.; The London Joint City & Midland Bank, Ltd.; The Yokohama Specie Bank, Ltd.

New York: The National City Bank of New York.; The National Bank of Commerce in New York.; The Yokohama Specie Bank, Ltd.

CORRESPONDENTS:
The Bank, in addition to its own Branches, has numerous Agencies or Correspondents in the principal Cities and Towns at Home and Abroad.

THE EAST ASIA INDUSTRIAL

COMPANY, LIMITED

(TOA KOGYO KABUSHIKI KAISHA)

TOKYO

ESTABLISHED 1909

FINANCIERS AND CONTRACTORS

K. ARAI, Esq., *President*

R. SHIRAIWA, Esq., *Managing Director*

Subscribed Capital	Yen 20,000,000
Paid-up Capital	„ 11,500,000

Branches: SHANGHAI, PEKING, HANKOW.

Hongkong and Shanghai Banking Corporation

Paid-up Capital	$15,000,000
Reserve Funds: Sterling	£2,500,000
Silver	$21,500,000
Reserve Liability of Proprietors	$15,500,000

Court of Directors:

G. T. M. EDKINS, Esq. Chairman
G. M. DODWELL, Esq. Deputy Chairman
D. G. M. BERNARD, Esq.
A. S. GUBBAY, Esq.
Hon. Mr. P. H. HOLYOAK
A. O. LANG, Esq.
Hon. Mr. E. V. D. PARR
W. L. PATTENDEN, Esq.
J. A. PLUMMER, Esq.
H. P. WHITE, Esq.

Head Office:
HONGKONG

Chief Manager:
HONGKONG . . . Hon. Mr. A. G. STEPHEN

London Bankers:
LONDON COUNTY WESTMINSTER AND PARR'S BANK LTD.

Shanghai Branch: 12 The Bund
Sub-Agency: 9 Broadway

Branches and Agencies:

AMOY, BANGKOK, BATAVIA, BOMBAY, CALCUTTA, CANTON, COLOMBO, FOOCHOW, HANKOW, HARBIN, ILOILO, IPOH, JOHORE, KOBE, KUALA LUMPUR, LONDON, LYONS, MALACCA, MANILA, NAGASAKI, NEW YORK, PEKING, PENANG, RANGOON, SAIGON, S. FRANCISCO, SHANGHAI, SINGAPORE, SOURABAYA, TIENTSIN, TSINGTAO, VLADIVOSTOCK, YOKOHAMA

Interest allowed on Current Accounts and on Fixed Deposits according to arrangement.

Local Bills Discounted. Credits granted on approved Securities and every description of Banking and Exchange business transacted. Drafts granted on London and the chief commercial places in Europe, India, Australia, Africa, China, Japan and America.

G. H. STITT, *Manager.*

THE JUGO GINKO, Ltd.

(THE FIFTEENTH BANK)

TOKYO, JAPAN

Telegrams: "Jugoginko, Tokio"

Capital Subscribed Y. 100,000,000 Capital Paid-Up Y. 49,750,000 Reserve Funds Y. 17,478,600

President:
HON. IWAO MATSUKATA

Vice-President:
MASAYASU NARUSE, Esq.

Managing-Directors:
YUTSUHA SATO, Esq.
KANESATO AIKO, Esq.

Directors:
BARON KOKICHI SONODA
MARQUIS YORIMICHI TOKUGAWA
VISCOUNT YUKIYOSHI AOYAMA
HON. NAGAYUKI ASANO
YOSHITERU SHIMIZU, Esq.
MASAO MATSUKATA, Esq.
KIYOSUMI TANIKAWA, Esq.

Auditors:
MASAKAZU HISANO, Esq.
BARON MICHITOMO IWAKURA
NAOYOSHI YAMAMOTO, Esq.
TAKAJI SEKIGUCHI, Esq.
TAKAYUKI IMAI, Esq.

Head Office Manager: **Kiyosumu Tanikawa, Esq.**

LONDON BANKS AND AGENTS:

LAZARD BROTHERS & CO., LTD.
UNION DISCOUNT CO. OF LONDON, LTD.
LONDON COUNTY WESTMINSTER AND PARR'S BANK, LTD.

BANK OF COMMUNICATIONS

(Specially authorised by Presidential Mandates of April 7th, 1914 and October 31st, 1915 making the Bank of Communications a National Bank).

Head Office: Peking

CAPITAL . . Kuping Tls. 10,000,000

President: TSAO JOU LIN

Vice-President: JEN FUNG PAO

Every description of Banking and Exchange business transacted.
Interest allowed on Current Accounts and Fixed Deposits according to arrangement.
Credits granted on approved Securities.
Special Facilities for Transfers to all parts of China.

Branches

CHIHLI PROVINCE.—Peking, Tientsin, Tungchow, Paotingfu, Haitien, Tangshan, Shuntefu, Shengfang.

SHANTUNG PROVINCE.—Tsinanfu, Tsininchow, Chefoo, Techow, Tsaochwang, Lungkow.

HONAN PROVINCE.—Kaifeng, Lohyang, Chengchow, Chiaotso, Chowchiakow, Taokow, Leiho, Hsinhsiang, Changtefu, Hsinyangchow.

SHANSI PROVINCE.—Shihchiachwang, Tatungfu, Fengcheng, Yangkao.

KIANGSU PROVINCE.—Shanghai, Soochow, Wusieh, Chinkiang, Yangchow, Tsing-kiangpu, Pukow, Penpu, Hsuchow.

CHEKIANG PROVINCE.—Hangchow, Ningpo.

HUPEH PROVINCE.—Hankow, Shasi, Ichang.

KIANGSI PROVINCE.—Kiukiang.

HUNAN PROVINCE.—Changsha, Changteh, Yochow, Hengchow, Hsiangtan

SZECHUAN PROVINCE.—Chungking.

ANHWEI PROVINCE.—Wuhu, Anking, Hsuancheng, Panpu

KWANGTUNG PROVINCE.—Canton.

THREE EASTERN PROVINCES.—Yinkow, Fengtien, Changchun, Kirin, Tiehling, Sunchiatai, Liaoyang, Harbin, Chinhsien.

SPECIAL DISTRICTS.—Jehol, Kueihuacheng, Lenghsien, Chihfeng, Hsinsi, Kalgan (Chahar).

ABROAD.—Hongkong, Singapore.

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SHEETS RODS TUBES

A superior grade of genuine hard or vulcanized fibre manufactured in America. Used extensively in the electrical, mechanical, trunk and baggage industries. By special process we eliminate dust, grit, metal and other substances, making DIAMOND-FIBRE especially pure and strong. Thus it can be sawed, cut, punched, drilled, threaded, tapped, bent, turned or stamped, with but little wear on tools. Because of its high dielectric strength it is used by the largest manufacturers of electrical equipment.

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Speedometer Gears	Receptacles	Robbin Heads and Boxes

Large stocks permit us to make prompt deliveries. Send for Booklet "DIAMOND-FIBRE and its Uses."

Diamond State Fibre Company

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Representative with stock in Tokyo, Kobe and Shanghai

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Contractors to . . .
BRITISH ADMIRALTY,
WAR OFFICE,
INDIA OFFICE,
TRINITY HOUSE, etc.

Prompt shipment of complete sets and accessories of every description

Immediate Delivery

ALSO MAKERS OF

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OXYGEN BREATHING APPARATUS For Rescue Work in Mines
MEDICAL OXYGEN APPARATUS for Resuscitation purposes
Oxygen Supplies of every description
Air Compressors Vacuum Pumps

SIEBE, GORMAN & CO., LTD.

187 WESTMINSTER BRIDGE ROAD,
LONDON, ENGLAND

Agents for Japan and South China: MITSUI BUSSAN KAISHA

Cables: "SIEBE, LONDON."

Codes used: A.1, A.B.C. (5th Edition), Western Union, Engineering & Private

Steel for Service

The All Steel elevated water tank for country estates, fire protection or municipal water supply provides a maximum of safety and service at a moderate expenditure.

A steel tank is long-lived, requires almost no outlay for upkeep, and will operate successfully in any climate.

We build standard designs for Municipal water works, Automatic fire sprinkler systems and Railway locomotive service.

Detailed data in Bulletin No. 60

Chicago Bridge and Iron Works

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216 Old Colony Bldg., Chicago
1006 Rialto Bldg., San Francisco
Cable Address: "CHIBRIDGE"

PITTSBURGH STEEL CO.

Pittsburgh, Pennsylvania, U.S.A.

Manufacturers of "PITTSBURGH PERFECT"

OPEN HEARTH STEEL PRODUCTS

INCLUDING

Galvanized Wire	Bolt and Rivet Wire
Bright Hard Wire	Galvanized Barbed Wire
Bright Nail Wire	Wire Nails
Annealed Wire	Fence Staples
Bright Soft Wire	

Pig-Iron, Blooms, Billets, Wire Rods, Hard Spring Coil Wire, Twisted Cable Wire, Bale Ties, Steel Hoops, Steel Bands, Cotton Ties and Fabricated Stock, Poultry and Lawn Fencing.

We are prepared to give PROMPT SERVICE, and solicit your inquiries accompanied by complete specifications.

ADDRESS:

PITTSBURGH STEEL CO.

EXPORT DEPARTMENT:
EQUITABLE BUILDING, NEW YORK, U. S. A.
Cable Address: "PITTSTEEL."

We accept facts.

Face them dispassionately.

Fairly comment upon them.

Why ?

They affect trade !

FAR EASTERN REVIEW

AMERICA-JAPAN-CHINA TRUST COMPANY, LIMITED

HEAD OFFICE:

6 Nakabashi Izumicho, Kyobashi-ku, Tokyo.

BRANCH OFFICE:

11 Imabashi Nichome, Higashiku, Osaka.

CAPITAL - - Y. 50,000,000.00

Directors:

Michitaka Sugawara, *Chairman*
Seiji Nawa, *Managing Director*
Toyotsune Mikami
Count Kinjiro Hirosawa
Wu Ting Chang
Kenji Imanishi, *Managing Director*
Taiji Arai
Seishichi Iwasaki
Saburosuke Fujisaki
F. N. Shea

Auditors:

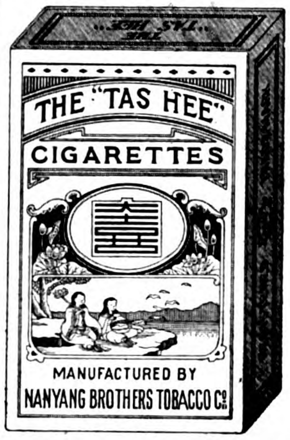
Kanzo Matsuo, Standing
Toyohiko Kuki
Motosaburo Kaneko
Takayoshi Kondo

Councillors:

Raizo Kanda
Katsutaro Kamada

Principal Business of this Company as follows:

1. Financing of Domestic and Foreign Enterprises.
2. Underwriting Public Bonds, Debentures and other Securities.
3. Guaranteeing Loans, Debts and Credits.
4. Issuing Letters of Credit and Accepting Bills.
5. Assisting in the Organization of various enterprises and in the financial re-adjustment of Companies.
6. All other kinds of Trust Business.



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The "Tas Hee" & "Szy Hee" brands of cigarettes.

They are not to be surpassed in excellence, selected from the most superior tobaccos, they will be found pleasing smokes by all. Connoisseurs agree that they are not to be excelled for their fragrance

中國南洋兄弟烟草有限公司啟

Try them and you will like them.

Obtainable at very moderate prices from most stores and stalls.

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Tobacco Co., Ltd.,
10 Dent Road

Head Office:
12 Nanking Road

BRILLIANT Half Watt LAMPS

give MORE LIGHT, BETTER LIGHT at LESS COST than any vacuum lamp.

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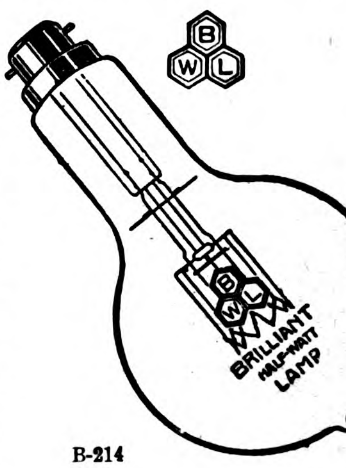
THE BRILLIANT ELECTRIC CO.

Dependable Suppliers of Everything Electrical.

博利安半華德電泡
加倍光明減半電費



博利安電料公司
上海英大馬路抛球場
電話中央四九〇七

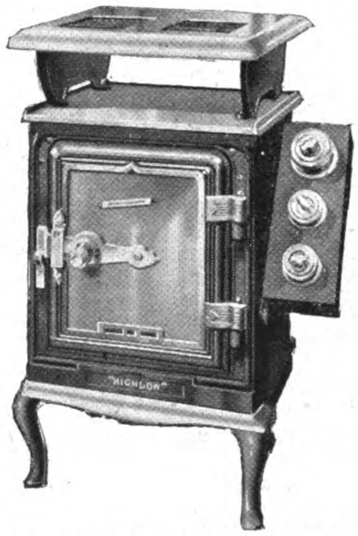
B-214

Electric Cooking "HIGHLOW" Apparatus

No. 50 Iron

Loading 500 Watts. Weight 6-lbs.

Thumb rest.
Strong Tip-up Stand.
Best Nickel-plated finish.



Electric Cooker. Total Loading 4 kw.

No. 60. ELECTRIC KETTLE. 750 Watts.
Polished Copper or Nickel-plated, 2 pints Capacity.

Elements are wound on clear ruby mica with nickel contacts taken direct to the terminals.

Heating and Cooking Apparatus for Domestic, Ship's and Restaurant use.

Catalogue on request to the Sole Makers:

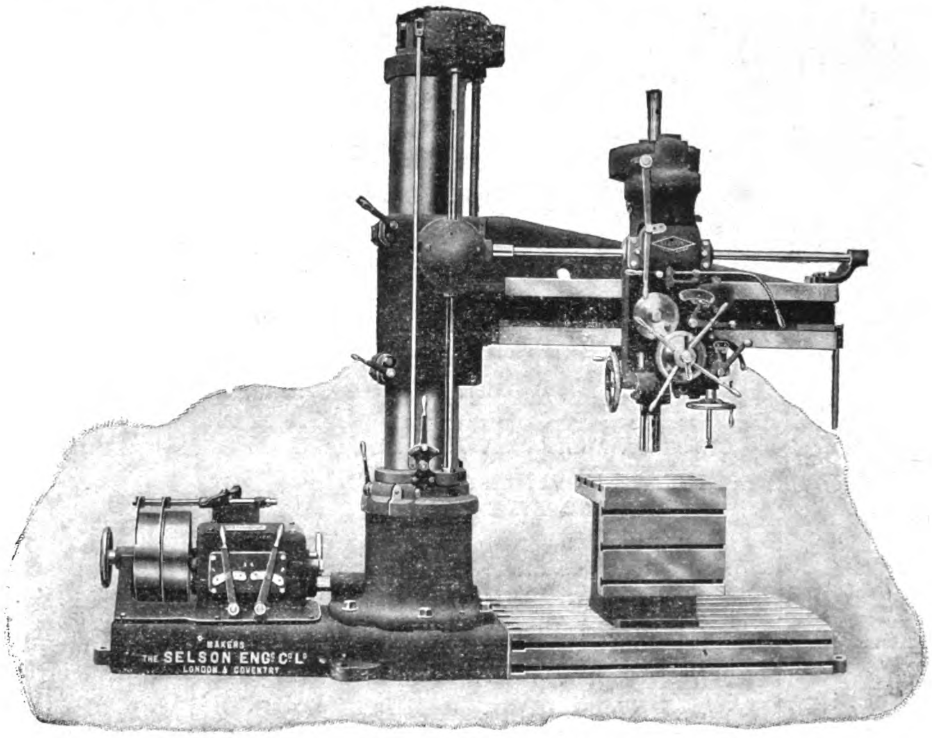
Telegrams:
"Highlow, Glasgow"

Archibald Low & Sons, Ltd.

Merkland Works, Partick, Glasgow, Scotland

Code: A.B.C.

The SELSON Central-Thrust Radial Drilling Machine



A HIGH-CLASS MACHINE

with many distinctive features

Sizes: 4-ft. 6-in. and 6-ft. radius

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Eng. Co., Ltd.

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Works: COVENTRY Cable Address: SELSONEER, London
Makers of Lathes, Shaping Machines and Engineers' Machine Tools generally. Also Small Tools.

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ROPE DEPARTMENT

Steel wire rope, Manila rope, White or tarred hemp rope, Trawl twine, Cotton rope and all other kinds of cordages, Steel wire and all other kinds of metallic wires.

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Sewing needle, Gramophone needle, Wire heald and all other kinds of wire work goods.

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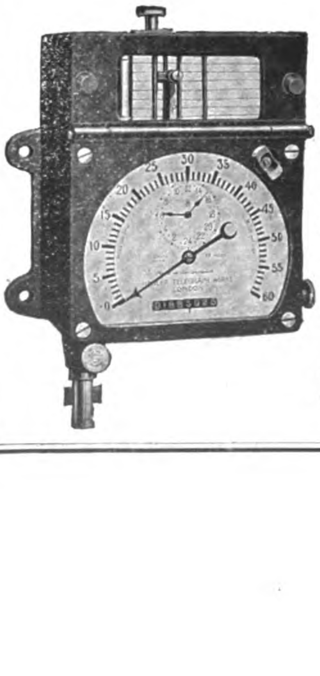


TELOC TYPE

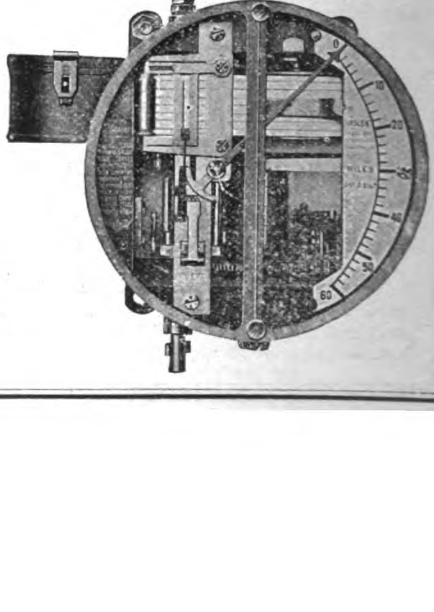
Chart Feed on a Mileage Basis of 10 m/m pe Mile.

INDICATES :—Speed.
Total mileage since application of Instrument.
Total mileage of each run.
Time of Day in Hours and Minutes.
RECORDS :—Speed attained at any point of run.
Time the engine or coach is at work.
Distance covered.
Duration (up to 24 hours) and point of stops.
Time of Day in Hours and Minutes.
If desired apparatus to record working of Westinghouse or Vacuum Brakes.

HASLER TYPE

Chart Feed on a Time Basis of 4 m/m pe Minute.

INDICATES :—Speed.
RECORDS :—Speed attained at any point of the run.
Time the engine or coach is at work.
Distance covered.
Duration and point of stops.
If desired bell can be fitted to ring at predetermined speed, or apparatus to record working of Westinghouse or Vacuum Brakes.



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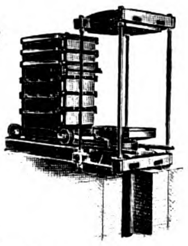
for packing goods of every description, for Home and Foreign transport.



Hydraulic Packing Press, for Cotton Waste, etc.

May we have your enquiries?

We make Presses and Pumps for Hand, Steam, and Electric Power.

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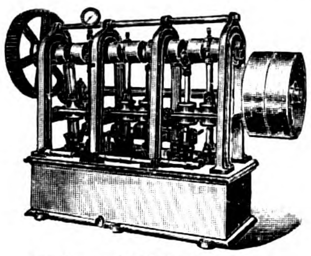

6 Throw Belt Driver Pump

Hydraulic Leathers, Pipes and Fittings always in stock.

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comes to your hands thoroughly dependable, having passed through an exhaustive test. Every part is constructed with the utmost care and of the very best materials. The barrels are made of high tensile strength steel of superior quality. Moreover, every Parker Gun has exclusive patented features, such as its *top lever*, which is made of forged alloy steel, heat treated to maximum strength and directly connected to the locking bolt without intermediate pins, screws or linkages. One of the famous

PARKER'S PRODUCTS
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We are also manufacturers of Bath Room Accessories, Coffee Mills, Cork Pullers, Lamps, Lemon Squeezers, Piano Stools, Chairs and Benches, Tinned Steel Spoons, Knives and Forks, Vices, Wood Screws, Alarm Clocks.

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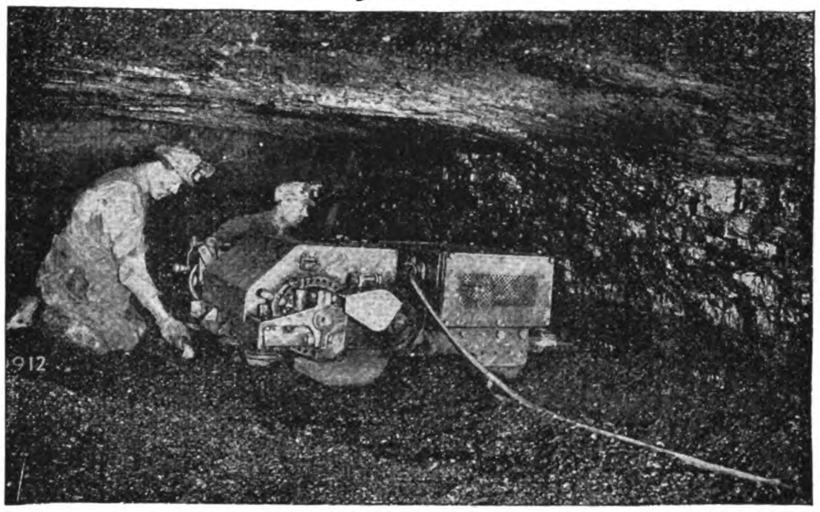
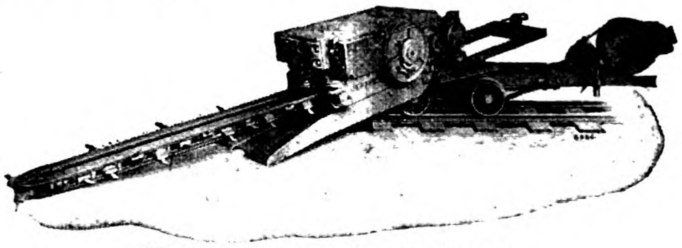
ESTABLISHED 1832
Representative in India: ELLIOTT & CO., Clive Row, Calcutta, India



Showing 35-B Coal Cutter cutting across the face.
All electrical parts are protected, making it impossible for runner to come in contact with live electrical parts.



The Jeffrey Self-Propelling Handi-Truck
reduces the time required in unloading the machine, putting it in place for cutting, pulling it back on the track and loading. Truck is provided with a tilting frame mounted so that it can be turned at any angle to the truck.

A simple and rugged machine, easily operated and controlled under all mine conditions

JEFFREY 35-B
Shortwall Mining Machine

Some Special Features:

Independent Feed Handling Mechanism. Narrow Cutter Bar and Narrow Base. Indestructible Machinery Steel Cutter Bar. Disc Clutch for Controlling Feed and Handling Drums slips in case of undue strain. Can be furnished with direct or alternating current, or compressed air motor.

Write for Bulletin No. 241

The Jeffrey Mfg. Co., Columbus, O., U.S.A.

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MINING EQUIPMENT

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Circular and Overland Trips at Greatly Reduced Rates

TOURIST TRAVEL OFF THE BEATEN TRACK

Tourists in the Far East should not miss Manchuria. Through Japan, Chosen (Korea), and Manchuria (or vice versâ) is an ideal trip, combining the distinctive characteristics of three unique and profoundly interesting countries.

THE CHOSEN AND MANCHURIA LINES are under the management of the South Manchuria Railway Company. Express trains have been temporarily suspended (except between Fusan and Seoul and Dairen and Changchun), but the **ORDINARY TRAINS ARE EQUAL TO MOST AMERICAN TRAINS,** run at least twice a day from each end, and to some of them Sleeping and Dining Cars are attached. Sleeping berths should be reserved in advance.

HOTELS under the Company's management are established **ON FOREIGN LINES** at **SEOUL** (capital of Chosen), **FUSAN** and **SHINGISHU** (the two extremities of Chosen), **KONGOSAN** (the famous Diamond Mountain of Korea, rivalling Switzerland in scenery), **MUKDEN** (ancient capital of China, home of the Manchuria Dynasty, noted for Imperial Palaces and Tombs), **CHANGCHUN** (junction for three railways and "key to Manchuria"), **PORT ARTHUR** (of world-wide fame for its historic sieges and ruined forts), **DAIREN** (one of the greatest commercial cities in the Orient), and **HOSHIGAURA** (the finest seaside resort in North China).

FROM DAIREN there are **FREQUENT AND REGULAR STEAMERS** to and from Shanghai, Tsingtao, Tientsin, etc.

For pictorial guide-books, pamphlets, and further particulars, apply to the Tourist and Ticket Agencies, or direct to the

SOUTH MANCHURIA RAILWAY COMPANY

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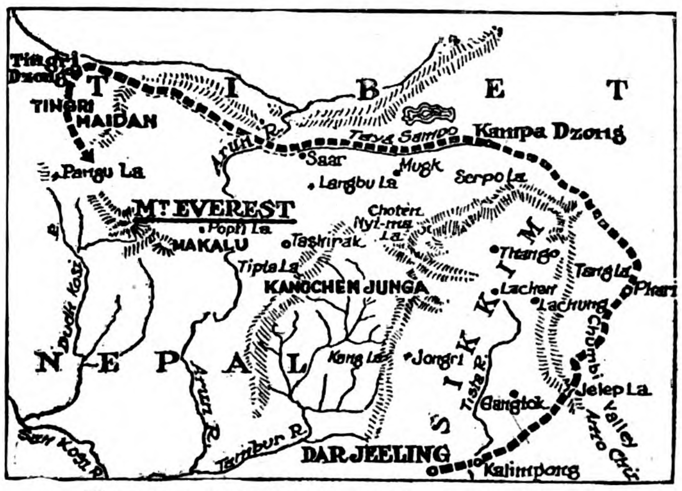
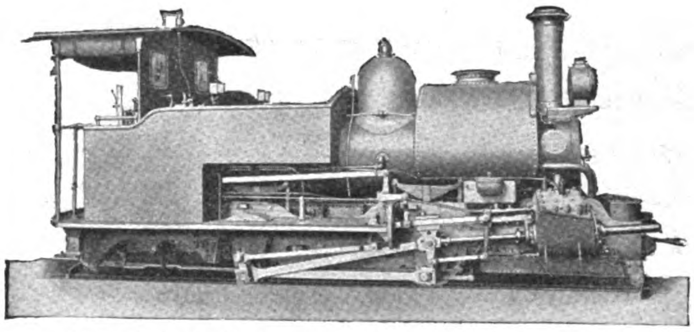
BALDWIN

Ascent of Mt. Everest

The British Expedition to attempt the ascent of the world's highest mountain peak is operating from its permanent base—Tingri Dzong—within forty miles of Everest. To reach the present headquarters, the Expedition's materials and supplies were conveyed over the Darjeeling-Himalayan Railway, on which are operated specially designed Baldwin Locomotives.



The route taken from Darjeeling to Mt. Everest



One of the Baldwin locomotives in operation on the Darjeeling Railway

The locomotives referred to were built to the individual specifications of the Railway Company, and were constructed to stand the severest strains. They are operated over a road having a 2-foot gauge; $3\frac{1}{2}$ per cent. gradient and curves of 60 feet radius. They are equipped with copper fire-boxes, copper stay bolts, brass tubes and Walschaerts valve motion. Soft coal is used for fuel.

Baldwin locomotives are in use in all parts of the world and for all purposes.

Our nearest representatives are always at the command of any railway to give any desired information regarding new power, the forwarding of duplicate and repair parts for locomotive maintenance, and to arrange for the forwarding of needed supplies from our Works to any part of the world.

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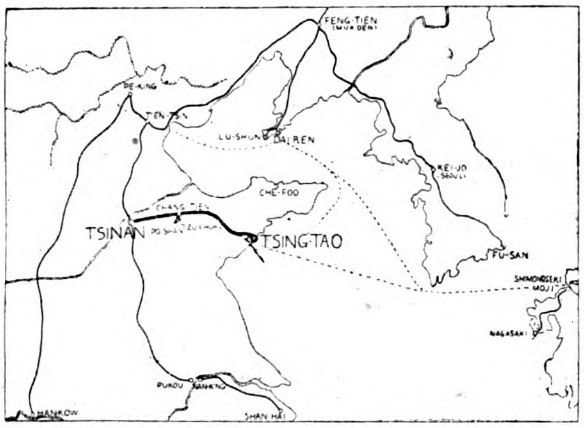
The Shortest Route between Japan and North China



THROUGH TRAFFIC

Through passenger tickets are issued between the following principal stations of the Shantung Railway: Kiaochow, Kaomi, Fangtsu, Weihsien, Chingchow, Changtien, Choustun, Tsinan, Tzuchuan, Poshan, and the following points: In Manchuria—Port Arthur, Newchwang, Liaoyang, Fushun, Mukden, Tiehling, Kaiyuan, Changchun, Penchihu, Antung, and Dairen; in Japan—Tokyo, Yokohama, Nagoya, Kyoto, Osaka, Kobe, Ujina, Moji, Shimonoseki, Nagasaki and Shanghai.

Steamer Connections—Steamers leave the wharves of the Large Harbour, Tsingtao, for Moji and Kobe every five days, for Shanghai about twice a week and for Dairen about three times a week.

For giving facilities to through passengers for Japan, a special train in connection with the night train No. 4 is operated from the Harbour Station to the Wharf, direct alongside the ship, on those days when the liners of the Nippon Yusen Kaisha, Osaka Shosen Kaisha, and Harada S.S. Co. are leaving.

Through passengers and their luggage are carried free of charge for this section.

Collieries—The Tzuchuan (Shisen) and Fangtzu (Boshi) Collieries are managed by the Mining Department of the Shantung Railway. At present the daily output of Tzuchuan coal is about 1,500 tons, far surpassing the amount taken out when the Germans were in control. The coal is well-known for its good quality and fair price.

Tsinan—Tsinan, the capital of Shantung, is the western terminus of the Shantung Railway, and also one of the most important stations on the Tientsin-Pukow Railway.

The Tsinan Railway Hotel, furnished in modern European style, is found on the upper floor of the Tsinan Station, under the control of the Shantung Railway Administration.

THROUGH TRAIN SERVICE

Train No. 1 leaves Tsingtao daily 8.00 a.m. arrives Tsinan 6.30 p.m.
Train No. 3 leaves Tsingtao daily 9.30 p.m. arrives Tsinan 8.30 a.m.
Train No. 2 leaves Tsinan daily 8.00 a.m. arrives Tsingtao 6.30 p.m.
Train No. 4 leaves Tsinan daily 11.00 p.m. arrives Tsingtao 9.30 a.m.

Local Trains run between Tsingtao and Kaomi, Weihsien and between Fangtzu and Tsinan, and on the Poshan and Tzuchuan colliery branches.

Fares—Tsingtao-Tsinan—1st class, $14.30 ; 2nd class, $7.20.

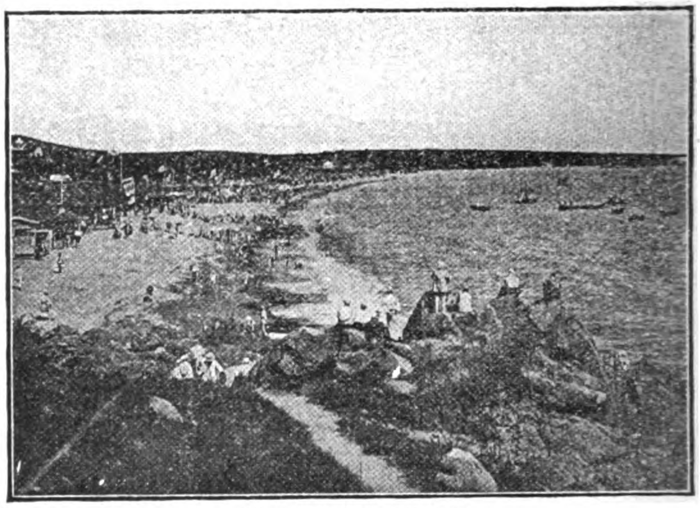
First Class Sleeping Car—A first-class sleeping car is attached to night trains Nos. 3 and 4 running between Tsingtao and Tsinan. For a berth in the sleeping car in S.Y. 3.00 for the lower berth and S.Y. 2.00 for the upper berth is charged in addition to the ordinary first-class fare, irrespective of distance.

Dining Car—A dining car is attached to through trains Nos. 1, 2, 3 and 4 running between Tsingtao and Tsinan. Meals are served to order at any time.

Ticket Agencies—Messrs. Thos. Cook & Son and their branch offices in various parts of the world. The Japan Tourist Bureau in Tokyo and their Agents in Yokohama, Kobe, Nagasaki and Peking.

Connections at Tsingtao—By steamer with Japan, Manchuria and Shanghai.

Connections at Tsinan—By Tientsin-Pukow Line with Tientsin, 6.00 & 9.38 a.m. daily, and with Pukow, 7.44 a.m. & 10.21 p.m. daily.



BATHING BEACH, TSINGTAO.

Description of Tsingtao

Tsingtao is considered the most healthful place in all the Far East. The scenery including both mountains and sea, is most beautiful. There are quite extensive forest gardens, bits of woodland here and there, and many delightful shady lanes affording most interesting walks through them.

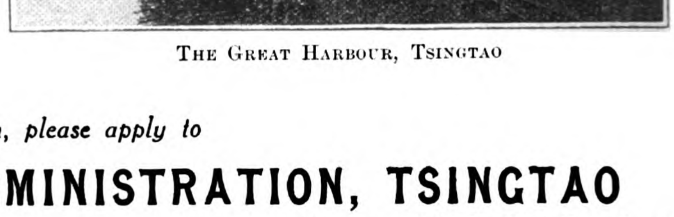
The roads are all broad, with very moderate gradients. They are of both macadamized and asphalt construction for vehicle traffic, while the sidewalks are either paved or concrete. These streets are practically all lined with beautiful shade trees.

The buildings are constructed principally in modern European style, with red tiles and white walls, contrasting pleasantly with the surrounding green mountains and blue sea.

The climate here is fine from Spring to Autumn, being neither too hot nor too cold. These climatic conditions make the place a favourite summer resort for Europeans and Americans from Shanghai, Tientsin, and other places.

The hotels are luxuriously furnished with up-to-date equipment and are under the efficient management of Mr. H. J. Hearne.

The hotel rates are $6.00 and up, per day, on the American plan.



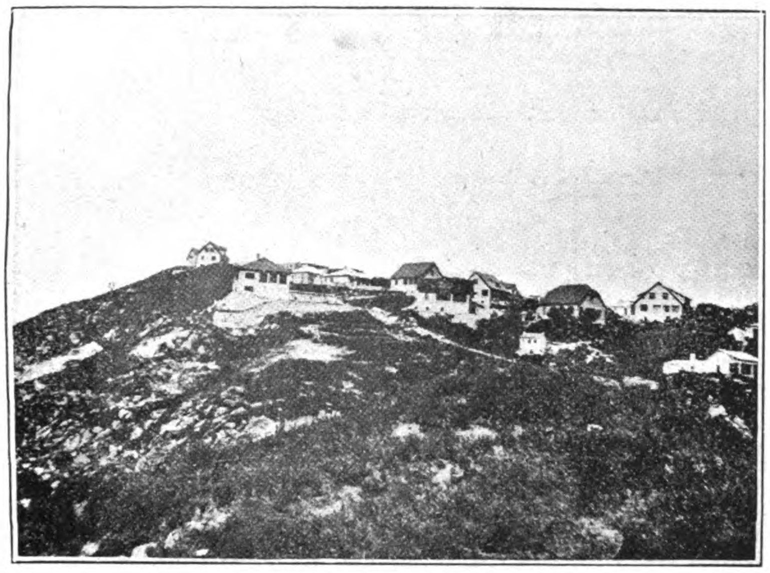
THE GREAT HARBOUR, TSINGTAO

For Further Information, please apply to

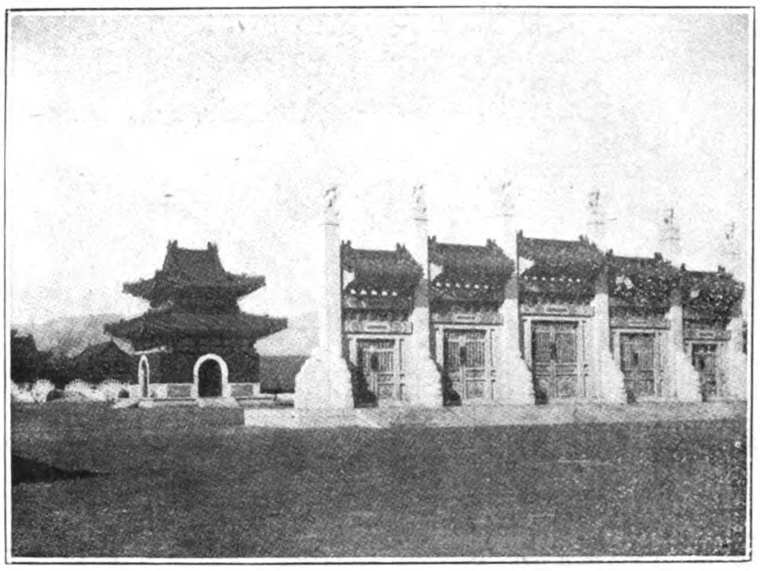
THE SHANTUNG RAILWAY ADMINISTRATION, TSINGTAO

CABLE ADDRESS: "SANTETSU" CODES: A.B.C. 5TH ED. & AI.

CHINESE GOVERNMENT RAILWAYS



SUMMER RESORT AT CHI KUNG SHAN



AT THE CHUNG LING TOMBS

PEKING-HANKOW LINE

"The Road Through The Heart of China"

THE Peking-Hankow Line, the most important section of China's overland route, enables tourists and travellers to get a glimpse of Old China, the train passing through magnificent scenery, traversing the great plains of Chihli, the central portion of Honan and the mountainous regions of the eastern Hupeh province.

The Peking-Hankow route joins at Fengtai the main line of the Peking-Mukden Railway, by means of which this line is connected with the railways in Manchuria, Korea, Japan, and Siberia, while steamer facilities at Hankow bring it into easy communications with the Yangtze River ports and Shanghai.

From the Capital to Hankow the journey occupies 34 hours, by the daily through train which is provided with up-to-date sleeping and dining accommodations.

In the future, this line will connect by means of a ferry-boat the Hankow-Canton Railway whose completion will bring the Capital of China, and Hankow, the Great Central Market, within easy distance of Canton the southeastern metropolie.

From the Capital to Hankow the journey about 30 hours by the bi-weekly "Express" through train which is provided with up-to-date sleeping and dining accommodations.

Chikungshan Mountain (Summer Resort).—Not many Summer Resorts in China inland, can bear comparison with the natural charming views, that reward those who ascend the mountain of Chikungshan, whose summit stands at an altitude of 1,980 ft. On reaching Sintien station, situated 110 miles from Hankow, a serpentine road climbs the mountain, on top of which are hundreds of beautiful bungalows awaiting vacationists. This popular resort is celebrated for its scenery, where an almost unbroken communion with nature can be enjoyed for a week at a time.

Hsi-ling or Western Imperial Tombs.—With their present-day accessibility, there is now little excuse for visitors to Peking omitting a trip to the Western Imperial Tombs, undoubtedly one of the most impressive sights in China. The site of these beautifully adorned Imperial Tombs is close to Liang Ko Chwang station, 79 miles from Peking, which is reached by a Branch-line, formerly built for the exclusive use of the Imperial Sovereigns when visiting the Tombs of their ancestors. The Western Tombs include the mausoleums of four Manchu Emperors and three Empresses, as well as those of a number of Princesses. The region, as a well laid-out park, closely wooded, is justly appreciated for the charming scenery surrounding the Imperial Tombs and is highly recommended to any one in search of the extraordinary and beautiful.

For Particulars, Pamphlets, Reservations, Tickets, etc., apply to the "Information Bureau" at Peking Head Office or to Tourist Agencies.

Telegraphic Address: "KINCO" **Codes: A.B.C. 5th Edition** **Telephone East 1698**

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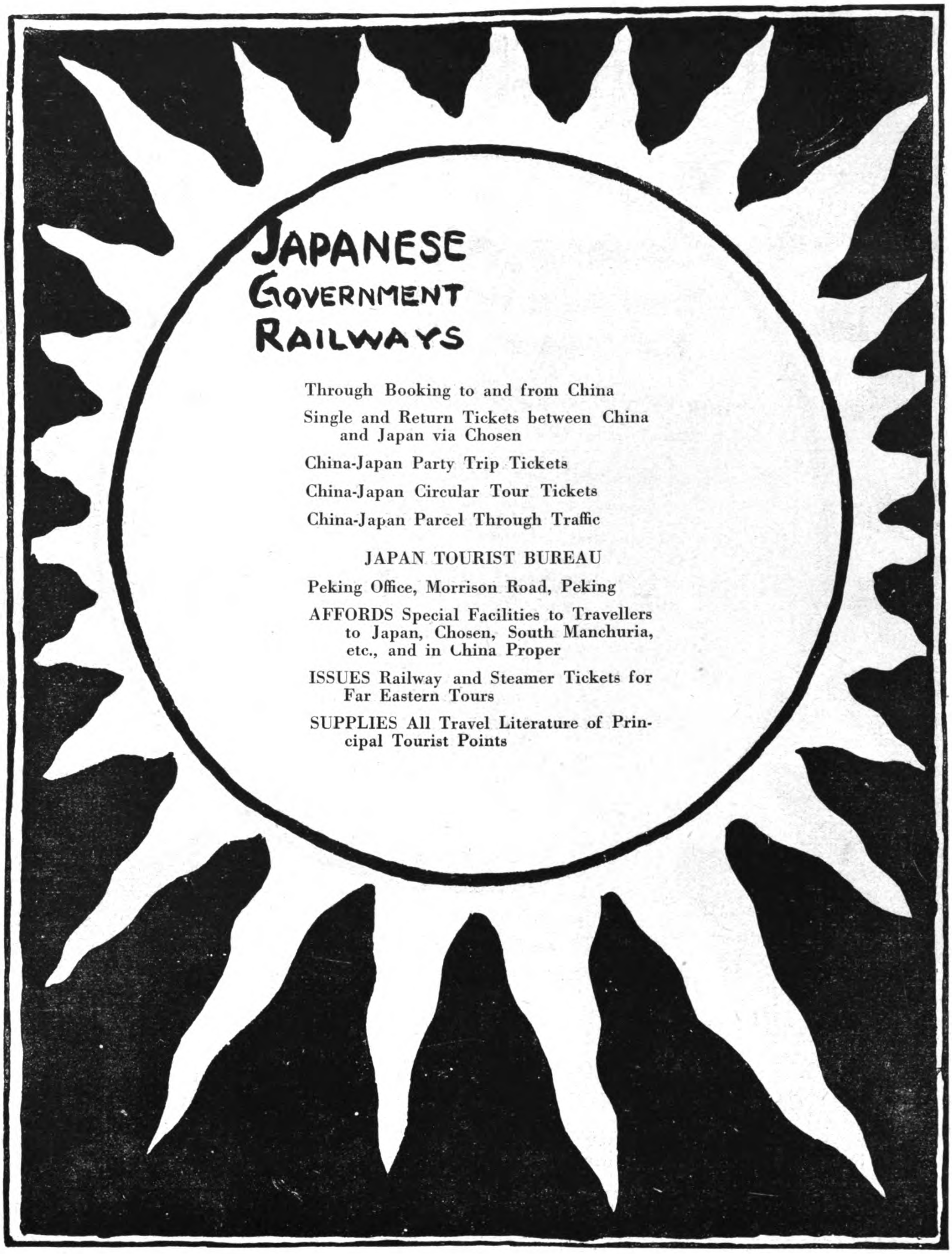
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Peking Office, Morrison Road, Peking
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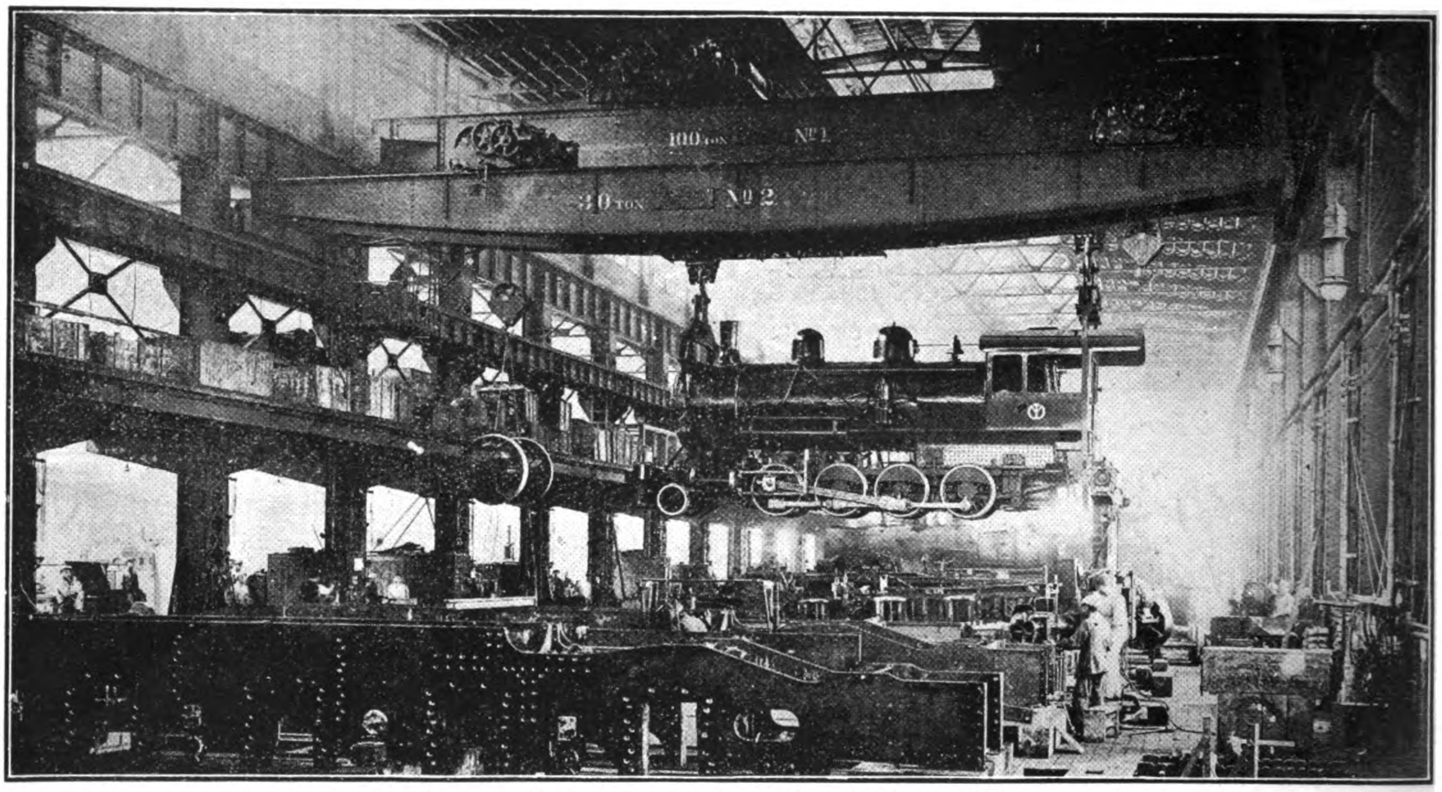
SUPPLIES All Travel Literature of Principal Tourist Points

SOUTH MANCHURIA RAILWAY

SHAKAKO RAILWAY WORKSHOPS



Interior of Engine Erecting Shop, Shakako Shops, S.M.R.

LARGEST AND MOST COMPLETE IN ALL MANCHURIA AND CHINA

AREA OF LAND: About 300,000 Tsubo. OFFICES & WORKSHOPS, 14,000 Tsubo

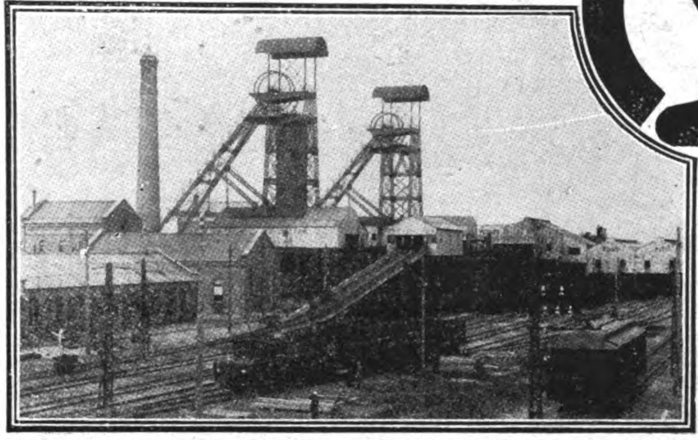
CAPACITY OF EXECUTING REPAIRS SIMULTANEOUSLY:

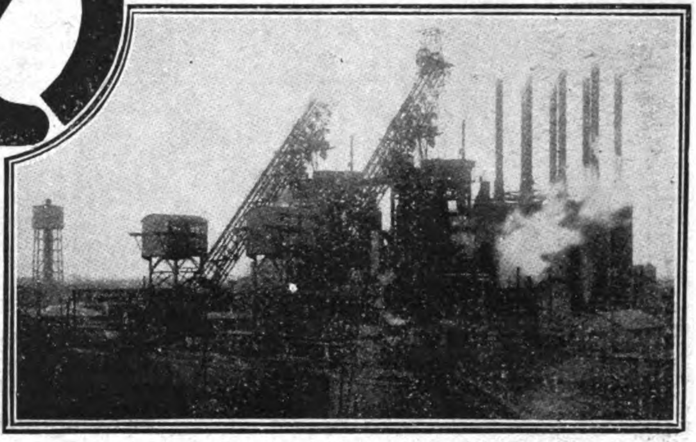
27 Locomotives, 36 Passenger Cars, and 130 Freight Cars, besides Constructing and Repairing other Railway Materials, Mining Machinery, etc. Employees: 5,000 Japanese and Chinese.

THE EAST IS EAST AND THE WEST IS WEST

SOUTH MANCHURIA RAILWAY

COAL IRON


Togo Pit of the S.M.R. Fushun Collieries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The Best Steaming Coal in the Far East | Fresh Stocks Always on Hand

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Chefoo	Takao (Formosa)	Osaka
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Penang	Niigata	etc.

Also Sulphate of Ammonia, Fire Clay, and Talc

Pamphlets and Particulars gratis from any of the above Depôts and Agencies, and from the

MINING DEPARTMENT,

South Manchuria Railway Company, Dairen

ANZAN IRON & STEEL WORKS

New Enterprise Set Up Like Magic Amidst the Wilderness of Manchuria.

TRACT OF LAND: about 4,000,000 tsubo.

BLAST FURNACE No. 1 (with a capacity for about 350 tons per day)
Opened to service on April 29, 1919.

BLAST FURNACE No. 2 (with a capacity for about 350 tons per day)
Made ready for service on February 24, 1920.

MEANS OF TRANSPORTATION in the plant: 24 miles of railway and 2.5 miles of electric tramway in operation, with three light locomotives and a number of slag-, coke, and ore-cars of from 8 to 24 tons.

A NEW TOWN SITE of 400,000 tsubo, with the necessary roads and water and sewage services, laid out and rented to lessees.

OFFICIALS AND EMPLOYEES: 2,300 Japanese and Chinese.

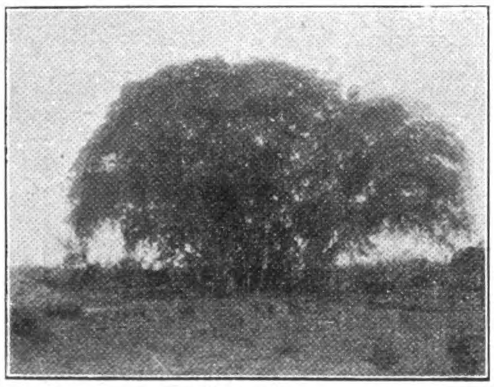
BUT THE TWAIN HAS MET AND BLENDED HERE

JAVA—THE WONDERLAND

HAVE YOU NOT YET VISITED JAVA?
IF NOT, DO SO NOW!

Bridge Bi Cis. Soerabaia Goods-shed, Java State Railways, Soerabaia City.

Girl Carrying Capoc.



Waringin.

Java, the peerless gem in that "magnificent Empire of Insulinde, which winds about the equator like a garland of emeralds," is the ideal tropical island, the greenest, the most beautiful and the most exquisitely cultivated spot in the East, the most picturesque and satisfactory bit of the tropics anywhere near the world's great routes of travel.

It fulfils the conception of what a paradise ought to be. It satisfies the imagination and more—for no Northern imagination ever conceived of skies so soft or indolent as these, of seas so serene and beautiful, of landscapes so exquisite or of nature so bountiful.

There is something here for every taste. The sportsman will find excellent big game shooting—the architect and the archeologist will delight in exploring the ruins of Buddhistic and Hinduistic temples. Those studying social and political problems resulting from colonial possessions can study here one of the most successful colonial systems existing. The geologist will grow enthusiastic over the many volcanoes active or quiescent, found here. At Buitenzorg, one hour's run from Batavia, the botanist has at his disposition the largest and best equipped Botanical gardens of the universe. The agriculturist will delight in the many cultures as f.i. rice, tea, coffee, rubber, etc., found here. Moreover, travelers are entirely safe in Java and even ladies alone can tour the island without inconvenience.

And to close this incomplete list of Java's advantages, it is singularly accommodating as regards climate. Thanks to the mountainous character of its physical conformation, and the different altitudes of its towns and hill stations, the visitor can select the climate best suited for his constitution. In a few hours he may change from the tropics to the temperate zone, may migrate from Batavia to Sindanglaja, 3,483 feet above the sea-level, or from Soerabaia to Tosari, at an altitude of 5,776 feet, and famous for its bracing air.

Few tourist playgrounds, in fact, are so favored, or possess a greater variety of attractive features.

THE JAVA GOVERNMENT RAILWAYS own 2,629 miles of thoroughly equipped lines, passing through all the principal Tourist centres.

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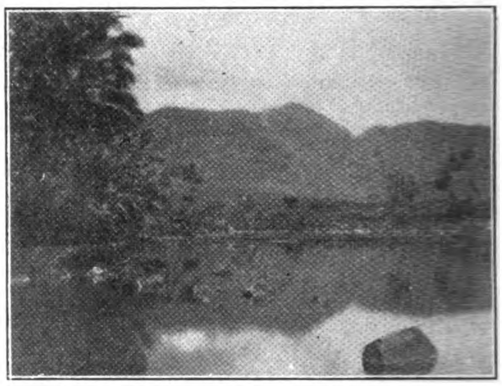
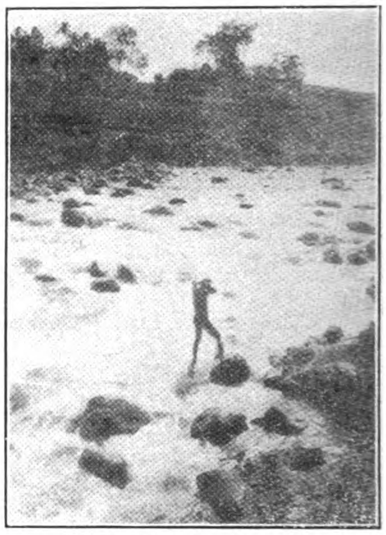
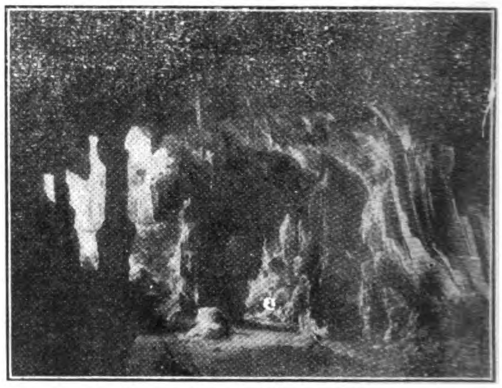
For full information and literature apply to the "Official Tourist Bureau" at Weltevreden, Rijswijk 18.



Pond in the Neighborhood of Garoet.



River Brantas, Malang.



Caves, South Coast, Java.

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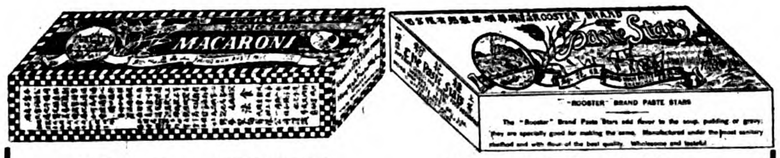

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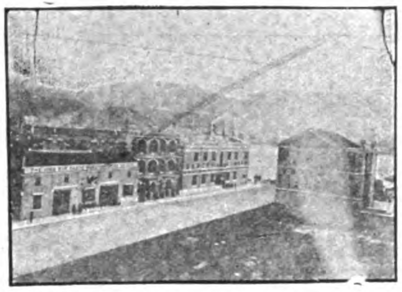

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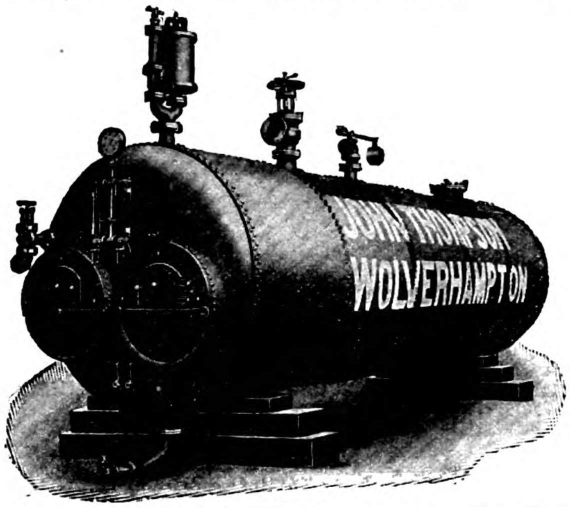

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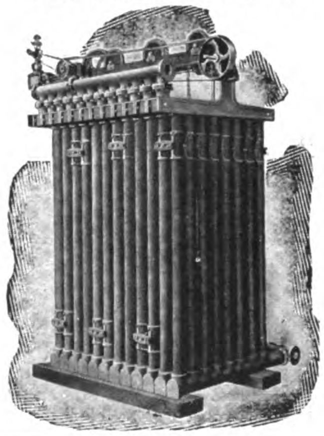

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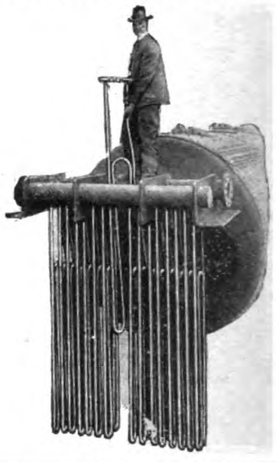

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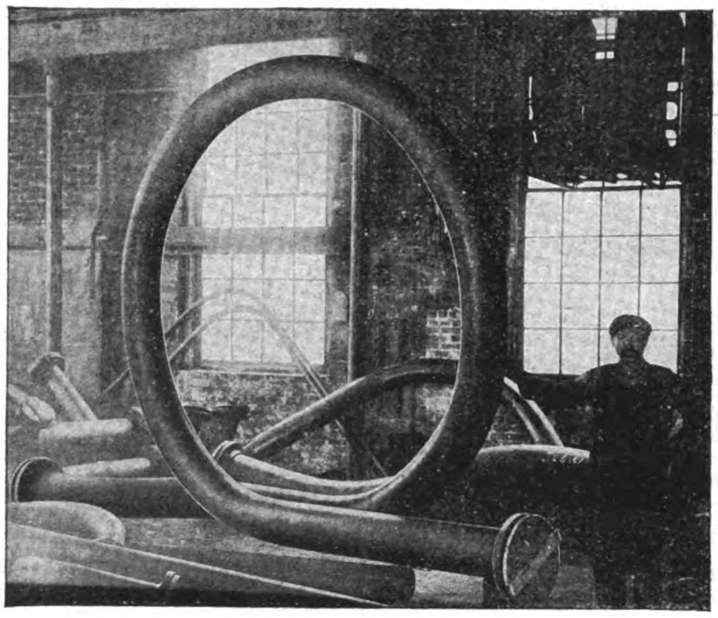

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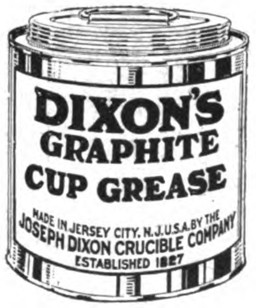

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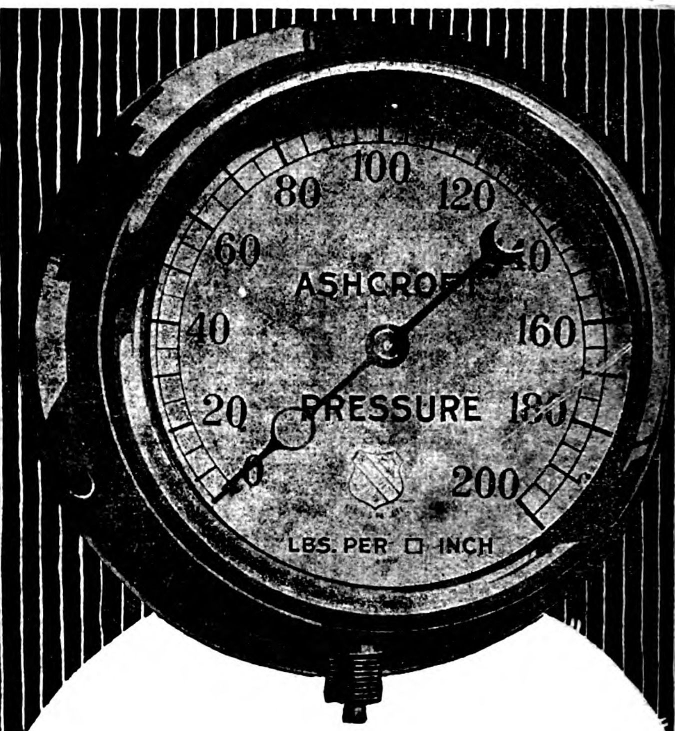

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The Far Eastern Review Supplement

CHINESE INDUSTRIAL COMPANIES

OCTOBER, 1921

Supplement to

The Far Eastern Review

SHANGHAI, OCTOBER, 1921

Chinese Industrial Companies

If the increasing number of industrial institutions that have come into being during the last twenty years is any indication of the effect that the foreign business man is producing in China then it may safely be conceded that marked headway is being made in the direction most desired. It is generally known that electric light plants, waterworks, filatures and mills of almost every description have appeared at various places, but perhaps no idea as to the extent of these developments in the interior equals that which is here to be revealed. The following is a list of companies registered at Peking showing the extent of their capital and the date of their establishment. The summary which follows the list contains a number of concerns which do not appear in the detailed report, so that the totals will not agree. The concerns referred to do not really come under the category of industrial establishments and have therefore been omitted. The list and the summary follow.

International Traders

MAN SHEN, native produce exporter, Roubles 150,000, Harbin, established June, 1911, registered June, 1911.

E-CHUNG, import, export and loans, Tls. 30,000, Japanese concession, Tientsin, established July, 1915, registered September, 1915.

WU DAH, LTD., import and export, $500,000, Peking, established April, 1917, registered June, 1917.

DA CHUNG, LTD., import and export, $500,000, Peking, established February, 1918, registered March, 1918.

HUA TUNG, LTD., international trading, $10,000,000, eastern city, Peking, established January, 1918, registered March, 1918.

Industrial Concerns

CHENG HUA, LTD., mining reclamation, shipping, railway, banking, etc., $3,000,000, Kwei-hsien, Kwangse, established January, 1910, registered February, 1910.

SINO-JAPANESE IND. CO., LTD., industry, $5,000,000, Peking, established May, 1914, registered June, 1914.

TUNG WEI, LTD., industrial and trust business, loans, $5,000,000, Peking, established September, 1915.

EASTERN PROVINCES INDUSTRIAL DEVELOPMENT CO., LTD., forestry, mining, reclamation, pasture, banking, $5,000,000, Fengtien, established July, 1915, registered December, 1915.

FO HUA, LTD., industrial, financial, trust, loans, $2,000,000, Peking, established November, 1915, registered November, 1916.

SINO-JAPANESE IND. CO., LTD., loans and development, Y.5,000,-000, Peking, established May, 1914, registered March, 1918.

YU FOONG, LTD., mining, forestry, finance, trust, etc., $200,000, Peking, established March, 1918, registered May, 1918.

YUNG CHUNG, LTD., minerals and timber, $300,000, Peking, established August, 1918, registered October, 1918.

DUNG TAI YUEN, LTD., cotton, yarn, oil, fur, hides, cereals, mining, industrial, loans, $500,000, An-yang-hsien, Honan, established May, 1918, registered January, 1919.

CHANGCHENG, LTD., cereals, manufacturers of bean oil and cake, and other agricultural products, $500,000, Changcheng, Kirin, established September, 1918, registered October, 1919.

YU FOONG, LTD., mining, forestry, finance, trust, etc., $200,000, Shanghai, established March, 1918, registered November, 1919.

CHUNG HUA, LTD., industry, $1,200,000, Tientsin, established June, 1919, registered November, 1919.

Printers, Stationers and Book-Sellers

HAN MEH LING PRESS, LTD., printer, $10,000, Tungchow, Kiangsu, established February, 1903, registered August, 1905.

PEKING BOOK CO., LTD., book-seller, $20,000, Liulichang, Peking, established June, 1906, registered August, 1906.

CANTON BOOK CO., LTD., book-seller and stationer, $80,000, Canton established June, 1906, registered October, 1906.

JOURNAL OF THE GENERAL CHAMBER OF COMMERCE OF CANTON, printer, newspaper publisher, $33,000, Canton, established October, 1906, registered November, 1906.

CHUNG KUO SHIH CHI WEI SHUI, LTD., stationer, $10,000, Haining Road, Shanghai, established July, 1906, registered October, 1907.

DOONG WEN PRESS, LTD., printer, $5,000, Weining, Anhwei, established August, 1907, registered November, 1907.

PIAO MOONG BOOK CO., LTD., publisher, stationer, $50,000, Shanghai, established November, 1908, registered April, 1909.

TSENG NEE & CO., LTD., stationer, $8,000, Chengtu, Szechuan, established May, 1909, registered May, 1909.

CHINA EDUCATIONAL SUPPLY CO., LTD., importer and manufacturer of scientific supply, $200,000, Shanghai, established July, 1908, registered August, 1909.

YUNG SHANG KUO & CO., LTD., Chinese ink manufacturer, $3,360, Nanhai-hsien, Canton, established March, 1829, registered October, 1909.

CHO EARH MIAO & CO., Chinese ink manufacturer, $8,000, Chinkiang, Kiangsu, established January, 1846, registered January, 1910.

WEISIN BOOK CO., LTD., stationer and book-seller, $5,000, Chintecheng, Kiangsi, established March, 1910, registered March, 1911.

CHUNG HO PRESS, LTD., printer, $10,000, Hangchow, established November, 1906, registered May, 1910.

YAO KIANG PRESS, LTD., printer, book-seller and stationer, $6,000, Yuyao, Chekiang, established July, 1910, registered March, 1911.

KUNG KEE PRESS, LTD., printer, Tls. 30,000, Chengtu, Szechuan, established April, 1911, registered June, 1911.

CHONG FO PRESS, LTD., printer, $120,000, Hwa-yang-hsien, Szechuan, established March, 1911, registered March, 1916.

COMMERCIAL PRESS, LTD., printer, publisher and stationer, $2,000,-000, Shanghai, established February, 1897, registered June, 1914.

YUEN TAH OIL INK MANUFACTORY, telegraph oil ink manufacturer, $4,000, Tientsin, established April, 1915, registered June, 1915.

CHUNG HUA BOOK CO., LTD., printer, publisher and stationer, $1,000,000, Shanghai, established April, 1913, registered July, 1914.

CHEKIANG PRESS, LTD., printer, $12,000, Hangchow, established August, 1912, registered August, 1914.

KIANGPEI PRESS, LTD., printer, $12,000, Hangchow, established August, 1912, registered August, 1914.

YIH YO BOOK CO., LTD., stationer and book-seller, $2,000, Liangshancheng, Szechuan, established February, 1913, registered September, 1915.

YUEN TAH INK MANUFACTORY, ink manufacturer, $2 000, Tientsin, established November, 1915, registered December, 1915.

YIH CHI BOOK CO., LTD., printer, stationer and book-seller, $10,000, Hanchung, Shensi, established October, 1917, registered May, 1918.

SIH CHENG PRESS, LTD., printer, $10,000, Wusih, Kiangsu, established January, 1915, registered February, 1919.

Soap and Candle Manufacturers

DA LUNG SOAP MANUFACTURING CO., LTD., $10,000, Tungchow. Kiangsu, established December, 1902, registered August, 1905.

TIENTSIN SOAP MANUFATURING CO., LTD., $205,000, Tientsin, established October, 1905.

JUI SHING SOAP CO , LTD , soap dealer, $3,000, Soochow, Kiangsu, established December, 1906, registered March, 1907.

YUNG HUA SOAP CO., LTD., soap dealer, $3,000, Tientsin, established May, 1907, registered May, 1907.

FO LI SOAP MANUFACTURING CO., LTD., $15,000, Chefoo, Shantung, established May, 1913, registered June, 1913.

TEH CHENG SOAP MANUFACTURING CO., LTD., Tls. 50,000, Shanghai, established October, 1914, registered October, 1915.

TING FOONG SOAP MANUFACTURING CO., LTD., $20,000, Shanghai, established June, 1916, registered September, 1916.

TIH SING SOAP MANUFACTURING CO., $20,000, Shanghai, established August, 1916, registered April, 1917.

AI HUA SOAP MANUFACTURING CO., LTD., $10,000, Shanghai, established December, 1915, registered May, 1917.

SUN MAN SOAP & ALCOHOL MANUFACTORY, LTD., $5,000, Changsha, Hunan, established February, 1917, registered November, 1917.

HUA CHONG SOAP MANUFACTURING CO., Tls. 5,000, Wuhu, Anhwei, established June, 1919, registered June, 1919.

KWANG JIN SOAP MANUFACTURING CO., $5,000, Wusih, Kiangsu, established April, 1919, registered September, 1919.

KAO SUNG DA SOAP MANUFACTURING CO., $5,000, Kiukiang, Kiangsi, established February, 1918, registered November, 1919.

HWA SUN SOAP & CANDLE MANUFACTURING CO., LTD., $100,000, Tientsin, established August, 1906, registered August, 1906.

KWANG MING SOAP & CANDLE MANUFACTURING CO., LTD., $20,000, Jin-hsien, Chekiang, established July, 1907, registered November, 1907.

ZIAG SUN SOAP & CANDLE MANUFACTURING CO., LTD., Tls.40,000, Shanghai, established April, 1908, registered September, 1908.

PAO SUN SOAP & CANDLE MANUFACTURING CO., LTD., $10,000, Changchow, Kiangsu, established April, 1903, registered October, 1909.

LI YUNG SOAP & CANDLE MANUFACTURING CO., LTD., $20,000, Shanghai, established April, 1909, registered February, 1910.

YIAO HUA SOAP & CANDLE MANUFACTURING CO., LTD., $6,000, Kwein-an-hsien, Chekiang, established April, 1910, registered April, 1910.

HAN CHONG SOAP & CANDLE MANUFACTURING CO., $24,000, Hankow, established January, 1916, registered September, 1917.

HARBIN INDUSTRIAL CO., LTD., soap, candle, alkali, tooth-powder, etc., manufacturer, $1,000,000, local currency, Harbin, established August, 1916, registered August, 1919.

YU FOONG CANDLE MANUFACTURING CO., Tls. 60,000, Shanghai, established November, 1908, registered November, 1908.

CHIN LIH CANDLE MANUFACTURING CO., LTD., $10,000, Shanghai, established April, 1907, registered February, 1910.

ZIANG CHENG CANDLE MANUFACTURING CO., LTD., Tls. 7,000, Shanghai, established December, 1908, registered July, 1909.

FO SHING ZIANG CANDLE MANUFACTURING CO., LTD., $10,000, Shanghai, February, 1909, registered March, 1910.

DOONG KONG CANDLE MANUFACTURING CO., Tls. 5,000, Shanghai, established April, 1908, registered February, 1910.

HWA TAI CANDLE MANUFACTURING CO., $5,000, Shanghai, established June, 1914, registered November, 1915.

Sugar Refineries

HWA ZIANG SUGAR REFINING CO., $500,000, Amoy, established March, 1909, registered January, 1910.

HWA SHING SUGAR REFINING CO., LTD., $200,000, Foochow, established February, 1916, registered March, 1916.

Candle-wicks Manufacturers

SHAN YUE & CO., LTD., manufacturer of candle-wicks and towels, $200,000, Shanghai, established February, 1916, registered August, 1918.

Steamship Companies

DA TA STEAMSHIP NAVIGATION CO., LTD., $56,000, Tungchow, Kiangsu, established July, 1904, registered August, 1905.

PA CHONG SHIPPING CO., shipping sugar, bean-cake, bean-seed, etc., Tls. 280,000, Chenghsi, Kwangtung, established July, 1902, registered August, 1905.

DA TA STEAMSHIP NAVIGATION CO., LTD., Tls. 1,000,000, Shanghai, established March, 1905, registered August, 1905.

CHUNG CHONG STEAMSHIP NAVIGATION CO., LTD., $30,000, Shanghai, established November, 1905, registered December, 1905.

SHIOU TSING RIVER STEAMSHIP NAVIGATION CO., LTD., Shantung, Tls. 100,000, Chefoo, Shantung, established January, 1905, registered July, 1906.

JUI FOONG STEAMSHIP NAVIGATION CO., LTD., $8,000, Soochow, Kiangsu, established October, 1906, registered November, 1906.

KUNG TEH FERRY LAUNCH CO., LTD., Tls. 30,000, Tatung, Anhwei, established October, 1905, registered March, 1907.

HWA CHENG STEAMSHIP NAVIGATION CO., LTD., Tls. 10,000, Hangchow, Chekiang, established May, 1908, registered May, 1908.

LI WEI STEAMSHIP CO., LTD., doing shipping service during the dredging work period of the Wei river of Anhwei, Tls. 150,000, Tseng-yang-kwang, Anhwei, established August, 1908, registered October, 1908.

SI KIANG STEAMSHIP NAVIGATION CO., LTD., $110,000, Wuchow, Kwangsi, established February, 1908, registered, April, 1909.

NING SHOU CHINESE MERCHANTS STEAMSHIP NAVIGATION CO., LTD., $1,000,000, Shanghai, established June, 1909, registered June, 1909.

CHINA MERCHANTS STEAMSHIP NAVIGATION CO., LTD., Tls. 4,000,000, Shanghai, established June, 1872, registered August, 1909.

TSENG FEI STEAMSHIP NAVIGATION CO., $40,000, Chefoo, Shantung, established March, 1903, registered April, 1910.

HSING AN STEAM LAUNCH CO., LTD., $22,000, Chefoo, Shantung, established December, 1909, registered April, 1910.

PEI HAI STEAMSHIP NAVIGATION CO., LTD., $100,000, Chefoo, Shantung, February, 1910, registered April, 1910.

MAO HEI SHING & CO., $50,000, Chefoo, Shantung, established 1906, registered May, 1910.

CHIEN KIANG STEAMSHIP NAVIGATION CO., LTD., Tls. 60,000, Hangchow, November, 1908, registered July, 1910.

NING FO STEAMSHIP NAVIGATION CO., LTD., $50,000, Chefoo, Shantung, established May, 1910, registered September, 1910.

TAO SUNG STEAM LAUNCH CO., LTD., Tls. 80,000, Teh-hua-hsien, Kiangsi, established September, 1906, registered February, 1911.

DO CHANG STEAMSHIP NAVIGATION CO., LTD., Tls. 480,000, Shanghai, established November, 1910, registered March, 1911.

SIN SANG STEAMSHIP NAVIGATION CO., LTD., $10,000, Changchow, Kiangsu, established January, 1912, registered April, 1913.

HWA WEI STEAM LAUNCH CO., LTD., $10,000, Weihaiwei, Shantung, established May, 1912, registered November, 1912.

TAI CHONG STEAMSHIP NAVIGATION CO., $30,000, Wuhu, Anhwei, established September, 1902, registered July, 1913.

CHUEN KIANG STEAMSHIP NAVIGATION CO., LTD., Tls. 300,000, Pa-hsien, Szechuan, established October, 1909, registered November, 1913.

LING HAI STEAM LAUNCH CO., LTD., $46,000, Linghai, Chekiang, established May, 1911, registered February, 1914.

YUNG CHI STEAMSHIP NAVIGATION CO., LTD., $3,000, Haiyien, Chekiang, established January, 1912, registered February, 1914.

SIN YIH STEAMSHIP NAVIGATION CO., $80,000, Chefoo, Shantung, December, 1913, registered March, 1914.

CHIEN YIH STEAMSHIP NAVIGATION CO., LTD., $5,000, Haiyien, Chekiang, established March, 1914, registered March, 1914.

TSENG KEE STEAMSHIP NAVIGATION Co., $120,000, Chefoo, Shantung, February, 1905, registered April, 1914.

YU SIN STEAM LAUNCH Co., $4,000, Shanghai, established October, 1913, registered April, 1914.

YIU AN STEAMSHIP NAVIGATION Co., LTD., $30,000, Shoushing, Chekiang, established January, 1914, registered April, 1914.

TSENG HAI STEAMSHIP NAVIGATION Co., LTD., $12,500, Tsenghai, Chekiang, established April, 1901, registered June, 1914.

JIEN TAI STEAMSHIP NAVIGATION, Co., LTD., $12,000, Foochow, established July, 1913, registered March, 1914.

HWA WEI STEAM LAUNCH Co., LTD., $12,000, Weihaiwei, Shantung, established May, 1912, registered August, 1914.

JU FOONG STEAMSHIP NAVIGATION Co., LTD., Tls. 24,000, Shanghai, established September, 1912, registered, September, 1914.

FO NING TEA MERCHANTS' STEAMSHIP NAVIGATION Co., LTD., $30,000, Foochow, established April, 1914, registered September, 1914.

TSAO SHING STEAMSHIP NAVIGATION Co., LTD., $150,000, Yingkow, Mukden, established August, 1911, registered October, 1914.

YIU TUNG STEAMSHIP NAVIGATION Co., LTD., $55,000, Haimen, Chekiang, established December, 1906, registered December, 1914.

YIN HAI STEAMSHIP NAVIGATION Co., LTD., $60,000, Shanghai, established May, 1911, registered December, 1914.

HEI LI TSENG STEAM LAUNCH Co., LTD., $50,000, Sha-tze, Hupeh, established March, 1913, registered, December 1914.

LI YUNG STEAMSHIP NAVIGATION Co., LTD., $20,000, Jin-hsien, Chekiang, established May, 1910, registered June, 1915.

HUNG CHI STEAM LAUNCH Co., LTD., $5,000, Yuan-hwa-cheng, Chekiang, established April, 1914, registered June, 1915.

SHING LUNG STEAM LAUNCH Co., $4,400, Kiukiang, Kiangsi, established May, 1914, registered June, 1915.

HSIANG KIANG STEAMSHIP NAVIGATION Co., LTD., Tls. 15,000, Hsiang-yin-hsien, Hunan, established November, 1914, registered June, 1915.

DOONG KEE STEAMSHIP NAVIGATION Co., LTD., $60,000, Shanghai, established February, 1906, registered July, 1915.

LI CHIH STEAMSHIP NAVIGATION Co., LTD., $20,000, Jin-hsien, Chekiang, established, 1905, registered August, 1915.

HANG CHU STEAM LAUNCH Co., $30,000, Chu-chi-hsien, Chekiang, established May, 1915, registered September, 1915.

TSENG SHING STEAMSHIP NAVIGATION Co., LTD., $60,000, Kiangkan, Chekiang, established September,.1915, registered February, 1916.

CHUNG HWA STEAMSHIP NAVIGATION Co., Ltd., $1,000,000, Changsha, Hunan, established July, 1912, registered March, 1916.

SAN PEI STEAMSHIP NAVIGATION Co., LTD., $200,000, Shanghai, established June, 1914, registered April, 1916.

CHINESE MERCHANTS' STEAMSHIP NAVIGATION Co., LTD., of Tungchow, Chungming and Haimen, $60,000, Shanghai, established March, 1916, registered April, 1916.

HONG KEE STEAMSHIP NAVIGATION Co., LTD., $40,000, Sha-tze-tseng, Hupeh, established June, 1913, registered May, 1916.

CHEN CHONG STEAMSHIP NAVIGATION Co., LTD., Tls. 300,000, Shanghai, established March, 1916, registered May, 1916.

TUNG CHI STEAMSHIP NAVIGATION Co LTD., $20,000, Jui-an, Chekiang, established September, 1914, registered October, 1916

CANTON STEAMSHIP NAVIGATION Co, LTD., $1,000,000, Canton, established June, 1913, registered March, 1917.

CHIAO TUNG STEAMSHIP NAVIGATION Co., LTD., $200,000, Chefoo, Shantung, established May, 1916, registered May, 1917.

YU FOONG STEAMSHIP NAVIGATION Co., LTD., Tls. 170,000, Ichang, Hupeh, established February, 1917, registered May, 1917.

CHUNG HWA SIN YU INLAND RIVERS STEAMSHIP NAVIGATION Co., LTD., $5,000, Wusih, Kiangsu, established February, 1912, registered June, 1917.

TSENG CHONG STEAMSHIP NAVIGATION Co., LTD., Tls. 100,000, Shanghai, established June, 1917, registered August, 1917.

YUEN SHING INLAND RIVERS STEAMSHIP NAVIGATION Co., $10,000, Lih-yang, Kiangsu, established December, 1915, registered December, 1917.

MINKIANG STEAMSHIP NAVIGATION Co, LTD., Tls. 120,000, Fanhsien, Szechuan, established November, 1917, registered January, 1918.

SAN PEH STEAMSHIP NAVIGATION Co., LTD., $1,000,000, Shanghai, established March, 1918, registered March, 1918.

YUEN TUNG STEAMSHIP NAVIGATION Co., LTD, $80,000, local currency, Foochow, established September, 1917, registered April, 1918.

LI CHENG INLAND RIVERS STEAMSHIP NAVIGATION Co., LTD., $9,000, Kiang-yin, Kiangsu, established February, 1918, registered October, 1918.

YUNG CHI STEAM LAUNCH Co., $10,000, Shoushing, Chekiang, established October, 1918, registered October, 1918.

TA TUNG STEAM LAUNCH Co., $10,000, Shoushing, Chekiang, established October, 1918, registered October, 1918.

NING SHOU STEAMSHIP NAVIGATION Co., LTD., $1,500,000, Shanghai, established June, 1909, registered November, 1918.

CHIAO TUNG STEAMSHIP Co., Y.200,000, Chefoo, Shantung, established July, 1918, registered December, 1918.

NING SHING STEAMSHIP NAVIGATION Co., LTD., $200,000, Shanghai, established November, 1917, registered 1919.

DOONG YIH STEAMSHIP NAVIGATION Co., LTD., Tls. 100,000, Shanghai, established September, 1918, registered February, 1919.

WU TUNG STEAMSHIP NAVIGATION Co., LTD., $2,000,000, Harbin, established March, 1919, registered June, 1919.

HUNG AN STEAMSHIP NAVIGATION Co., LTD., $450,000, Shanghai, established December, 1918, registered July, 1919.

HUANG AN STEAMSHIP NAVIGATION Co., LTD., $1,000,000, Shanghai, established December, 1918, registered August, 1919.

CHUNG HWA SIN YU INLAND RIVERS STEAM LAUNCH NAVIGATION Co., LTD., $10,000, Wusih, Kiangsu, established February, 1912, registered October, 1919.

Railway Transportation Companies

SHAOCHOW-SWATAO RAILWAY TRANSPORTATION Co., LTD., freight and passenger transportation service, $2,500,000, Swatao, Kwangtung, established May, 1908, registered August, 1905.

SHONGCHENG LIGHT RAILWAY Co., LTD., $109,200, Shongcheng, Kirin, established February, 1913, registered October, 1916.

Automobile Transportation Companies

YEN FO CHIEN AUTOMOBILE TRANSPORTATION Co., LTD., $100,000, Foochow, established September, 1917, registered January, 1918.

KALGAN-URGA AUTOMOBILE TRANSPORTATION Co., LTD., $100,000, Kalgan, established February, 1918, registered October, 1918.

KALGAN-URGA AUTOMOBILE TRANSPORTATION Co., LTD., $100,000, Kalgan, April, 1918, registered February, 1919.

Metal Works

YUEN CHONG METAL WORKS, metal casting, $100,000, Shanghai, established February, 1883, registered January, 1908.

YU YUNG METAL WORKS, manufacturing different kinds of metal implements, Tls. 20,000, Yung-hwa-tseng, Szechuan, established November, 1910, registered December, 1910.

SUN DA IRON WORKS, LTD., manufacturing machinery, iron tools, $12,000, Sin-Jih-tseng, Chili, established May, 1911, registered June, 1912.

TUNG SIN MACHINERY Co., manufacturing ginning machines, $30,000, Shanghai, established March, 1902, registered April, 1914.

LI YUNG METAL WORKS, LTD., manufacturing brass and iron wares, $10,000, Kirin, established June, 1912. registered May 1914.

TSENG DA KETTLE MANUFACTORY, LTD., casting kettles, $50,000, Wusih, Kiangsu, established September, 1914, registered July, 1914.

Wu Ling Iron Works, casting iron, $20,000, Hangchow, established March, 1914, registered October, 1915.

Yang-tze Machinery Co., Ltd., machinery, Tls. 1,000,000, Hankow, established August, 1907, registered March, 1916.

Sin Yao Machinery Co., manufacturer and lender of machinery and metal wares, Tls. 10,000, Shanghai, established January, 1919, registered March, 1919.

Da Yao Machinery Co., manufacturer and lender of machinery, $15,000, Shanghai, established April, 1919, registered July, 1919.

Rice Husking Mills

Han Sun Rice Husking Co., Ltd., Tls. 100,000, Nanchong, Kiangsi' established March, 1908, registered September, 1908.

Yuen Chong Rice Husking Mill, $400,000, Shanghai, established June, 1898, registered January, 1908.

Wu Cheng Rice Husking Co., Ltd., Tls. 100,000, Ningpo, established July, 1906, registered November, 1906.

Shao Foong Rice Husking Co., Ltd., Tls. 100,000, Hanyang, Hupeh, established June, 1907, registered June, 1907.

Nanchong Rice Husking Co., Ltd., Tls. 30,000, Pootung, Shanghai, established October, 1908, registered October, 1908.

Sin Chong Rice Husking Co., Ltd., Tls. 50,000, Shanghai, established September, 1908, registered January, 1909.

Da Tah Rice Husking Co., Ltd., $50,000, Nantungchow, established February, 1917, registered April, 1917.

Doong FoongRice Husking Co., Ltd., Tls. 40,000, Wuhu, Anhwei, established August, 1917, registered January, 1918.

Tah Fu Rice Husking Co., Ltd., $50,000, Tungtai-hsien, Kiangsu, established June, 1919, registered November, 1919.

Flour Mills

Man Sin Flour Mill, $60,000, Wusih, established August, 1903, registered January, 1905.

Da Shing Rye & Flour Mill, $25,000, Tungchow, Kiangsu, established December, 1901, registered August, 1905.

Hai Foong Rye & Flour Mill, $200,000, Kung-yu-hsien, Kiangsu, established April, 1905, registered September, 1905.

Da Foong Flour Mill, Tls. 100,000, Tsing-ho-hsien, Kiangsu, established January, 1906, registered June, 1906.

Yung Chien Flour Mill, Tls. 30,000, Tientsin, established May, 1906, registered September, 1906.

Hwa Shing Flour Mill, $400,000, Shanghai, established September, 1900, registered January, 1907.

Yu Hun Flour Mill, Tls. 200,000, Yanchow, Kiangsu, established July, 1907, registered September, 1907.

Han Foong Flour Mill, Tls. 200,000, Hankow, established December, 1905, registered November, 1907.

Fou Foong Flour Mill, $1,000,000, Shanghai, established March, 1898, registered August, 1908.

Yung Yuen Flour Mill, Tls. 20,000, Che-foong-cheng, Chili, established December, 1907, registered October, 1908.

Yu Hong Flour Mill, Tls. 100,000, Hsuchow, Kiangsu, established December, 1908, registered November, 1908.

Kiu Foong Flour Mill, Tls. 150,000, Wusih, Kiangsu, established, July, 1909, registered April, 1911.

Sheng Da Flour Mill, Tls. 200,000, Shanghai, established October, 1909, registered May, 1910.

Yung Foong Flour Mill, Tls. 200,000, Sho-chien, Kiangsu, established February, 1909, registered February, 1910.

Fu Sin Flour Mill, Tls. 110,000, Nantungchow, established November, 1909, registered September, 1910.

Hun Fa Yu Flour Mill, Tls. 120,000, Wu-cheng-hsien, Kirin, established March, 1910, registered December, 1910.

Da Yue Flour Mill, Tls. 25,000, Shanghai, established April, 1913, registered May, 1913.

Hun Foong Flour Mill, $59,000, Wusih, established February, 1913, registered July, 1913.

Shing Cheng Fo Flour Mill, $50,000, Tsinan, Shantung, established August, 1913, registered October, 1913.

Fo Sin Flour Mill, $60,000, Chapei, Shanghai, established July, 1913, registered April, 1914.

Wei Yuen Flour Mill, $150,000, Wusih, Kiangsu, established December, 1913, registered April, 1914.

Yu Chen Wu Flour Mill, $50,000, Nin-an-hsien, Kirin, established October, 1910, registered May, 1914.

East Asia Flour Mill, $90,000, Harbin, established April, 1913, registered May, 1914.

Sin Nee Flour Mill, $160,000, Sha-tze, Hupeh, established April, 1912, registered September, 1914.

Da Tung Flour Mill, $50,000, Da-doong-hsien, Shansi, established April, 1914, registered September, 1914.

Sin Tai Flour Mill, $8,000, Ge-sui-hsien, Kiangsi, established April, 1914, registered December, 1914.

Tseng Sin Flour Mill, $50,000, Pootung, Shanghai, established September, 1914, registered March, 1915.

Tai Lung Flour Mill, $200,000, Wusih, Kiangsu, established February, 1914, registered April, 1915.

Yung Chi Flour Mill, $120,000, Jone-wun-hsien, Heilungkiang, established October, 1914, registered May, 1915.

The First Flour Mill of Hunan, Tls. 100,000, Changsha, Hunan, established July, 1915, registered October, 1915.

Teh Lung Flour Mill, $45,000, Peking, established February, 1913, registered August, 1915.

Yi Chen Flour Mill, Tls. 200,000, Chinkiang, Kiangsu, established May, 1915, registered November, 1915.

Pao Sin Flour Mill, $160,000, Wusih, Kiangsu, established 1915, registered December, 1915.

Chung Shing Water Power Flour Mill $5,000, Peking, established October, 1915, registered December, 1915.

Foong Nien Flour Mill, $100,000, Tsinan, established October, 1915, registered January, 1916.

Da Foong Flour Mill, Tls. 100,000, Wei-yin, Kiangsu, established September, 1915, registered January, 1916.

Sin Hwa Flour Mill, $100,000, Ning-an-kwan, Kirin, established January, 1913, registered March, 1916.

Chang Ning Flour Mill, $200,000, Ning-an-hsien, Kirin, established January, 1914, registered May, 1916.

Yung Yuen Flour Mill, $50,000, Wu-chen-hsien, Kirin, established, March, 1916, registered May, 1916.

Chang Foong Flour Mill, $200,000, Shanghai, established August, 1915, registered June, 1916.

Fo Sin Flour Mill, $300,000, Shanghai, established October, 1915, registered July, 1916.

Feu Ning Flour Mill, $200,000, Ning-an-hsien, Kirin, established June, 1913, registered October, 1916.

Man Lan Fo Flour Mill, $300,000, Chefoo, Shantung, established October, 1916, registered October, 1916.

Hun Man Flour Mill, $320,000, Kirin, established October, 1916, registered December, 1916.

Yung Foong Flour Mill, $40,000, Kaifengfu, Honan, established March, 1914, registered February, 1917.

Tien Shing Flour Mill, $30,000, Iran, established May, 1917, registered May, 1917.

Tai Foong Flour Mill, $200,000, Tsi-ning, Shantung, established April, 1916, registered August, 1917.

Show Sin Flour Mill, $250,000, Tientsin, established May, 1915, registered August, 1917.

Lih Da Flour Mill, Tls. 200,000, Shanghai, established February, 1908, registered August, 1917.

Chang Foong Flour Mill, $100,000, Chang-teh, Hunan, established May, 1917, registered September, 1917.

Hing Wah Paste Manufacturing Co., Ltd., $60,000, Shanghai, established June, 1917, registered October, 1917.

Fo Sin Flour Mill, $300,000, Shanghai, established July, 1914, registered August, 1918.

Wei Foong Flour Mill, $300,000, Tsinan, Shantung, established September, 1918, registered November, 1918.

Yi Cheng Flour Mill, Tls. 150,000, Chinkiang, Kiangsu, established August, 1918, registered December, 1918.

Yo Chen Hei Flour Mill, $150,000, Ning-an-hsien, Kirin, established September, 1918, registered December, 1918.

Tien Foong Flour Mill, $150,000, Kaifengfu, Honan, established September, 1918, registered December, 1918.

Tai Lai Flour Mill, $200,000, Shanghai, established June, 1907, registered March, 1919.

Tung Foong Flour Mill, $500,000, Sin-shang-hsien, Honan, established January, 1919, registered May, 1919.

Yung Nih Flour Mill, $3,200,000, local currency, Ho-lan-hsien, Heilungkiang, established March, 1919, registered October, 1919.

Man Sin Flour Mill, $600,000, Wusih, Kiangsu, established February, 1904, registered October, 1919.

Shou Sin Flour Mill, $250,000, Tientsin, established May, 1915, registered December, 1919.

Yang Hui Flour Mill, $8,000, Peking, established December, 1914, registered February, 1915.

Rice, Oil and Flour Mills

Yih Sin & Co., Ltd., husking rice and making flour and oil, Tls. 250,000, Taichow, Kiangsu, established June, 1907, registered April, 1908.

Tai Lai & Co., Ltd., husking rice and making flour, $120,000, Taichow, Kiangsu, established June, 1907, registered April, 1908.

Chung Yu & Co., Ltd., rice warehouse and husker, $200,000, Wuhu, Anhwei, established October, 1909, registered January 1910.

Yi Lai Man & Co., Ltd., flour, rice-husking and saw mill, $120,000, Peking, established August, 1910, registered May, 1914.

Paper Mills

Hun Yu Tin Foil Mill, Tls. 120,000, Shanghai, established November, 1906, registered July, 1906.

Chinkiang Paper Mill, Tls. 225,000, Chinkiang, Kiangsu, established March, 1907, registered April, 1907.

Yi Tsi Sun Paper Mill, Tls. 6,000, Chen-hsien, Chili, established January, 1912, registered June, 1912.

Lo Li Paper Mill, $100,000, Chengtu, Szechuan, established December, 1906, registered August, 1909.

Kiangtu Paper Mill, $126,600, Sin-wei-hsien, Kwangtung, established May, 1911, registered September, 1915.

Cheng Nih Paper Mill, $50,000, Tsinan, Shantung, established February, 1917, registered December, 1917.

Hwa Shing Paper Mill, $1,000,000, Tsinan, established April, 1919, registered October, 1919.

Oil Mills

Kwang Sun Oil Mill, Tls. 150,000, Nantungchow, established August, 1902, registered August, 1905.

Da Yue Oil Mill, Tls. 100,000, Shanghai, established June, 1905, registered September, 1905.

Kung Foong Oil Mill, Tls. 300,000, Haichow, Kiangsu, established March, 1906, registered September, 1906.

Yu Shing Oil Mill, Tls. 200,000, Feu-yang-hsien, Anhwei, established December, 1906, registered December, 1906.

Tsing Hwa Oil Mill, Tls. 20,000, Tsing-hwa-tseng, Honan, established February, 1907, registered June, 1907.

Yung Foong Oil Mill, $10,000, Tientsin, established June, 1907, registered June, 1907.

Chi Sin Oil Mill, Tls. 100,000, Chow-chia-kow, Honan, established November, 1907, registered September, 1907.

Mieh Fa Oil Mill, $600,000, Swatow, Kwangtung, established, 1909, registered, 1911.

Chong Fa Oil Mill, $400,000, Swatow, established 1911, registered 1911.

Da Yuen Oil Mill, $100,000, Chinkiang, Kiangsu, established 1913, registered March, 1914.

Chien Hun Oil Mill, $70,000, Hei-shan-hsien, Fengtien, established May, 1915, registered September, 1915.

Hun Chin Oil Mill, $55,000, Ning-an-hsien, Kirin, established January, 1916, registered June, 1916.

Hun Yu Oil Mill, Tls. 100,000, Shanghai, established September 1915, registered July, 1916.

Sin Chong Oil Mill, Tls. 130,000, Shanghai, established June, 1915, registered October, 1916.

Tai Foong Oil Mill, $300,000, Tai-an-hsien, Shantung, established April, 1919, registered October, 1919.

Tile and Brick Plants

Kih Ziang Tile & Brick Plant, Tls. 10,000, Nanchong, Kiangsi, established December, 1906, registered January, 1907.

Yuen Tai Ziang Tile, Brick & Lime Plant, Tls. 6,000, Shanghai, established June, 1907, registered June, 1907.

Da Hun Tile & Brick Plant, Tls. 10,000, Peking, established June, 1908, registered September, 1908.

Shing Kee Tile & Brick Plant, Tls. 20,000, Wuhu, Anhwei, established January, 1908, registered February, 1908.

Cheng Hung Tile & Brick Plant, $15,000, Chengtu, Szechuan, established July, 1908, registered May, 1909.

Yu Yih Tile Plant, $320,000, Canton, established 1908, registered 1910.

Da Cheng Tile & Brick Plant, $30,000, Changsha, Hunan, established May, 1915, registered October, 1915.

Chi Sin Tile & Brick Plant, $15,000, Tsinan, Shantung, established April, 1918, registered February, 1919.

Porcelain Ware Manufacturing Companies

Hwa Pao Porcelain Ware Manufacturing Co., Ltd., $120,000, Amoy, Fukien, established February, 1904, registered August, 1905.

Chiun Yao Porcelain Ware Manufacturing Co., Ltd., $50,000, Yu-chow, Honan, established December, 1904, registered August, 1905.

Li Lin Porcelain Ware Manufacturing Co., Ltd., $100,000, Li-lin-hsien, Hunan, established September, 1906, registered July, 1907.

Kiangsi Porcelain Ware Manufacturing Co., Ltd., $200,000, Pinhshang, Kiangsi, established July, 1904, registered January, 1909.

Pingshang Porcelain Ware Manufacturing Co., Ltd., $200,000, Pingshang, Kiangsi, established July, 1904, registered January, 1909.

Yang-chien-nee-ching-chai, Porcelain Ware Manufacturing Co., Ltd., $100,000, Shanghai, established April, 1909, registered June, 1909.

Chuen Sze Porcelain Ware Manufacturing Co., Ltd., $50,000, Lu-chow, Szechuan, established January, 1910, registered November, 1909.

Da Cheng Tin Cans Manufacturing Co., Ltd., $50,000, Tientsin, established May, 1915, registered July, 1915.

Chung Shing Porcelain Manufacturing Co., Ltd., $300,000 Shon-yang-hsien, Kirin, established March, 1914, registered January, 1919.

Glass Factories

Po-shan Glass Manufacturing Co., Ltd., Tls. 150,000, Po-shan, Shantung, established February, 1905, registered May, 1905.

Lo-shan Glass Manufacturing Co., Ltd., Tls. 200,000, Changsha, Hunan, established September, 1915, registered September, 1915.

Pu Li Glass Ware Manufacturing Co., Ltd., $30,000, Tsinan, established December, 1915, registered September, 1916.

Kwang Ming Glass Ware Manufacturing Co., Ltd., $24,000, Peking, established April, 1917, registered October, 1919.

Lime and Cement Plants

Chi Sin Lime, Tile & Brick Plant, $1,000,000, Tientsin, established August, 1906, registered October, 1907.

Hupeh Cement Plant, Tls. 1,023,340, Ta-yen, Hupeh, established August, 1907, registered May, 1909.

Chi Sin Lime Plant, $300,000, Tientsin, established April, 1909, registered June, 1909.

Doong Sin Lime Plant, $5,000, Wei-yang, Kwangtung, established March, 1912, registered April, 1914.

Leather Factories

Tientsin Leather Supplies Factory, Tls. 550,000, Tientsin, established 1898, registered June, 1905.

Pu Li Leather & Woolen Cloth Manufacturing Co., Ltd., Tls.1, 000,000, Wan-ping-hsien, Chili, established May, 1909, registered September, 1909.

Lung Hwa Leather Factory, Tls. 300,000, Paoshan, Kiangsu, established March, 1907, registered April, 1910.

Kung Hwa Leather Factory, $500,000, Shanghai, established 1907, registered April, 1911.

Tee Chuan Leather Factory, $20,000, Chengtu, Szechuan, established August, 1912, registered November, 1914.

Chung Chen Leather Factory, $12,000, Chengtu, established June, 1915, registered July, 1915.

Yu Tsing Leather Factory, $1,000,000, Tientsin, established May, 1916, registered October, 1918.

Filatures, Cotton Mills, Dyeing Factories

Yu Chong Steam Filature, $140,000, Wusih, established June, 1903, registered September, 1904.

Tung Chiu Yuen Cotton Mill, $900,000, Ningpo, established April, 1894, registered June, 1905.

Da Sun Cotton Mill, $1,130,000, Nantungchow, Kiangsu, established April, 1896, registered August, 1905.

Chiu Lung Branch of the Da Sun Cotton Mill of Nantungchow, Tls. 600,000, Chiu-lung-tseng of Chungming, Kiangsu, established July, 1904, registered August, 1905.

Yu Yuen Hemp Weaving Co., Ltd., Tls. 200,000, Wuhu, Anhwei, established, 1904, registered October, 1905.

Ho Foong Spinning & Weaving, Co., Ltd., $600,000, Ningpo, established September, 1905, registered December, 1905.

Tseng Sin Cotton Mill, $300,000, Wusih, Kiangsu, established February, 1907, registered January, 1906.

Hwa Cheng Cotton & Silk Weaving Co., Ltd., $9,000, Kiangyin, Kiangsu, established August, 1905, registered February, 1906.

Yu Tai Cotton Mill, Tls. 500,000, Chao-wen-hsien, Kiangsu, established August, 1905, registered February, 1906.

Yih Hwa Weaving Factory, $10,000, Peking, established June, 1906, registered June, 1906.

King Yuen Dyeing & Weaving Co., Ltd., $10,000, Han-kung-hsien, Fukien, established June, 1906, registered June, 1906.

Shanghai Silk Filature, Tls. 400,000, Shanghai, established June, 1906, registered July, 1906.

Hwa Foong Weaving Factory, $5,000, Peking, established August, 1906, registered September, 1906.

Pao Hwa Weaving Factory, Tls. 10,000, Pao-tee-hsien, Chili, established August, 1906, registered November, 1906.

Tsi Tai Cotton Mill, Tls. 500,000, Tsi-chong, established November ,1905, registered November, 1906.

Tsi Tai Cotton Mill, Tls. 500,000, Tai-chong, Kiangsu, established November, 1905, registered November, 1906.

Tai Ho Weaving Factory, $6,000, Tai-chow, Kiangsu, established November, 1906, registered November, 1906.

Fu Chiang Weaving Factory, $50,000, Kweiling, Kwangsi, established May, 1907, registered February, 1907.

Sin Cheng Weaving Factory, Tls. 10,000, Po-chow, Anhwei, established March, 1907, registered April, 1907.

Yih Yuen Chang Cloth Manufactory, $8,000, Wei-ning-hsien, Anhwei, established March, 1907, registered April, 1907.

Tsing Yuen Spinning & Weaving Co., Ltd., Tls. 10,000, Wen-chow-fu, Shansi, established April, 1907, registered September, 1907.

Sih Chin Silk Filature, Tls. 30,000, Changchow, Kiangsu, established January, 1907, registered November, 1907.

Yu Shing Weaving Co., Ltd., $15,000, Chao-wen-hsien, Kiangsu, established October, 1905, registered December, 1907.

Kung Yih Spinning & Weaving Co., Ltd., $1,340,000, Shanghai, established September, 1907, registered January, 1908.

Doong Chong Weaving Co., Ltd., Tls. 10,000, Peking, established 1908, registered February, 1908.

Tung Yih Kung Cotton Mill, $1,273,300, Hangchow, Chekiang, established, 1905, registered March, 1908.

Yah Woo Steam Filature, Tls. 160,000, Shanghai, established 1906, registered April, 1908.

Hung Shing Weaving Co., Ltd., $105,000, Shanghai, established September, 1907, registered May, 1908.

Yang Hwa Silk Weaving Co., Ltd., $200,000, Hangchow, Chekiang, established October, 1906, registered September, 1908.

Joint Corporation of The Su-chin Silk Filature & The Su-lun Cotton Mill, Tls. 1,057,600, Soochow, Kiangsu, established, 1896, registered October, 1908.

Teh Chong Silk Filature, Tls. 31,500, Chen-teh, Kwangtung, established, May, 1907, registered November, 1908.

Li Yung Cotton Mill, Tls. 400,000 Kiangyin, Kiangsu, established July, 1907, registered January, 1909.

Shih Hwei Wool Weaving Co., Ltd., Tls. 500,000, Shanghai, established January, 1909, registered January, 1909.

Kwang Yih Cotton Mill, Tls. 1,000,000, Chong-teh, Honan, established January, 1905, registered April, 1909.

Wang Pu Weaving Co., Ltd., $50,000, Canton, established July, 1907, registered June, 1909.

Shu woo Spinning & Weaving Factory, $10,000, Paoting, Chili, established September, 1910, registered October, 1909.

Kwang Yu Dyeing & Weaving Co., Ltd., $20,000, Kwang-ning, Fengtien, established October, 1909, registered November, 1909.

Yu Sin Cotton Mill, Tls. 220,000, Soochow, Kiangsu, established December, 1909, registered January, 1910.

Yah Lun Silk Filature, $50,000, Shanghai, established October, 1910, registered March, 1910.

Yuen Kong Silk Filature, $200,000, Wusih, Kiangsu, established May, 1910, registered May, 1910.

Yung Sin Weaving Co., Ltd., $70,000, Nanhai, Kwangtung, established November, 1909, registered July, 1910.

Nanhai Hemp Cloth Weaving Factory, $200,000, Nanhai, Kwangtung, established July, 1910, registered August, 1910.

Tsing Yu Power Ginhouse, $40,000, Yu-yao, Chekiang, established September, 1910, registered October, 1910.

Kung Yu Silk Filature, Tls. 100,000, Huchow, Chekiang, established October, 1910, registered October, 1910.

Tsing Yu Weaving Factory, $10,000, Changchow, Kiangsu, established November, 1906, registered January, 1911.

Ah Tung Weaving Factory, $200,000, Canton, established February, 1909, registered January, 1911.

Kwang Sin Shirts & Hosiery Manufacturing Co., $40,000, Hongkong, established May, 1909, registered April, 1911.

Teh Chen Weaving Co., Ltd., $50,000, An-yang, Honan, established February, 1911, registered April, 1911.

Da Nih Chong Weaving Co., Ltd., $20,000, Liau-yang, Fengtien, established August, 1911, registered August, 1911.

Chia Yu Cocoon Factory, $20,000, Yu-yen-te, Chekiang, established March, 1911, registered September, 1911.

Kwang Nih Weaving Co., Ltd., $31,000, Fengtien, established February, 1912, registered July, 1912.

Wei Chong Silk Weaving Co., Ltd., $20,000, Hangchow, Chekiang, established May, 1912, registered December, 1912.

Tseng Sin Silk Weaving Co., $40,000, Hangchow, established July, 1911, registered February, 1914.

Hwa Sin Cotton Spinning, Co., Ltd., $3,000,000, Shih-chia-cheng, Chili, established September, 1912, registered May, 1914.

Tsung Sin Wu Silk Filature, $50,000, Chenteh, Kwangtung, established January, 1914, registered May, 1914.

Li An Shirts & Hosiery Manufacturing Co., Ltd., Tls. 30,000, Shanghai, established March, 1913, registered July, 1914.

Yung Chin Weaving Co., Ltd., $300,000, Sha-tze, Hupeh, established May, 1912, registered September, 1914.

Chih Cheng Cotton Spinning Co., Ltd., $2,500,000, Sha-tze, Hupeh, established May, 1914, registered October, 1914.

Yung Sin Weaving Co., Ltd., $70,000, Nanhai, Kwangtung, established October, 1912, registered November, 1914.

Nee Chang Canvas Manufacturing Co., Ltd., $100,000, Tientsin, established March, 1915, registered April, 1915.

Ting Sin Spinning & Weaving Co., Ltd., $200,000, Hangchow, Chekiang, established October, 1914, registered July, 1915.

Chuen Wu Hosiery Manufacturing Co., Ltd., Tls. 20,000, Sungkiang, Kiangsu, established February, 1910, registered August, 1915.

Chu Shing Spinning & Weaving Co., Ltd., $780,000, Wuchang, Hupeh, established May, 1913, registered August, 1915.

Teh Da Cotton Mill, Tls. 200,000, Shanghai, established May, 1915, registered August, 1915.

Hei Nee Steam Filature, $240,000, Shiao-shan, Chekiang, established December, 1906, registered February, 1916.

Tung Wei Kung Cotton Mill, $600,000, Shiao-shan, established December, 1906, registered February, 1916.

Da Chin Weaving Co., Ltd., $100,000, Nantungchow, Kiangsu, established November 1915, registered February, 1916.

Da Lun Weaving Co., Ltd., $90,000, Changchow, Kiangsu, established January, 1916, registered February, 1916.

Hung Yu Spinning & Weaving Co., Ltd., Tls. 600,000, Shanghai, established September, 1916, registered August, 1916.

Hwa Sin Spinning & Weaving Co., Ltd., $10,000,000, Tientsin, established August, 1916, registered September, 1916.

Wuhu Spinning & Weaving Co., Ltd., Tls. 500,000, Wuhu, established July, 1916, registered December, 1916.

Chang Kee Spinning & Weaving Co., Ltd., $65,000, Tientsin, established February, 1915, registered January, 1917.

Kwang Jin Spinning & Weaving Co., Ltd., $700,000, Wusih, established December, 1916, registered January, 1917.

Yu Yuen Spinning & Weaving Co., Ltd., $2,500,000, Tientsin, established November, 1915, registered February, 1917.

Chin Pu Weaving Factory, $80,000, Shanghai, established June, 1916, registered April, 1917.

Ho Ling Silk Textile Plant, $200,000, Hangchow, Chekiang, established September, 1914, registered May, 1917.

Hun Yuen Canvas Manufacturing Co., Ltd., $100,000, Tientsin, established April, 1916, registered May, 1917.

Yung Da Dyeing & Weaving Co., Tls. 20,000, Shanghai, established April, 1916, registered July, 1917.

Pu Yih Spinning & Weaving Co., Ltd., Tls. 800,000, Shanghai, established November, 1916, registered July, 1917.

Wei Cheng Silk Textile Plant, $400,000, Hangchow, established November, 1917, registered November, 1917.

Da Sung Dyeing & Weaving Co., Ltd., $90,000 Nanchang, Kiangsi, established August, 1916, registered December, 1917.

Ming Sun Shirts & Hosiery Manufacturing Co., $100,000, Hongkong, established February, 1914, registered March, 1918.

Yu Yuen Spinning & Weaving Co., Ltd., $2,000,000, Tientsin, established November, 1915, registered April, 1918.

Kung Sin Dyeing & Weaving Co., Ltd., $70,000, Wuchang, established January, 1918, registered May, 1918.

Mo Sun Spinning & & Weaving Co., Ltd., Tls. 1,200,000, Shanghai, established June, 1917, registered June, 1918.

Yung Yuen Dyeing & Weaving Co., Ltd., $300,000, Shanghai, established April, 1918, registered July, 1918.

Hung Chong Dyeing & Weaving Co., Ltd., Tls. 100,000, Shanghai, established April, 1918, registered July, 1918.

Fo Cheng Cotton Mill, $200,000, Wusih, established March, 1916, registered July, 1918.

Chi Ming Dyeing & Weaving Co., Ltd., $100,000, Shanghai, established June, 1918, registered August, 1918.

Chung Hwa Cotton Weaving Co., Ltd., $100,000, Yientai, established October, 1917, registered August, 1918.

Chin Lun Shirts & Hosiery Manufacturing Co., Ltd., Tls. 120,000, Shanghai, established January, 1917, registered August, 1918.

Sun Sin Spinning & Weaving Co., $300,000, Shanghai, established August, 1916, registered August, 1918.

Chin Wu Hosiery Manufacturing Co., $10,000 Sungkiang, Kiangsu, established May, 1917, registered October, 1918.

Tseng Ah Weaving Co., $40,000, Soochow, established July, 1917, registered January, 1919.

Sin Shing Weaving Factory, $50,000, Shing-hsien, Shansi, established November, 1918, registered February, 1919.

Ho Ling Silk Textile Plant, $300,000, Hangchow, established March, 1918, registered November, 1919.

Pao Cheng Spinning & Weaving Co., Ltd., $1,600,000, Shanghai, established March, 1919, registered November, 1919.

Shing Hwa Cotton Mill, $2,000,000, Tientsin, established October, 1919, registered November, 1919.

Chung Hwa Weaving Co., Ltd., $50,000, Shanghai, established July, 1919, registered December, 1919.

Electricity Plants

Da Chao Electric Light Co., Ltd., Tls. 100,000, Chinkiang, Kiangsu, established May, 1904, registered September, 1905.

Hwa Cheng Electric Light Co., Ltd., $100,000, Swatow, Kwangtung, established December, 1905, registered April, 1906.

Chinese Merchants' Electric Light Co., Ltd., Tls. 200,000, Tsinan, Shantung, established June, 1905, registered May, 1907.

Ming Yuen Electric Light Co., Ltd., Tls. 180,000, Wuhu, established May, 1906, registered May, 1908.

Tseng Shing Electric Light Co., Ltd., Tls. 100,000, Soochow, established November, 1908, registered November, 1908.

Chi Tsi Electric Light Co., Ltd., $3,000,000, Hankow, established July, 1906, registered January, 1909.

Taiyuen Electric Light Co., Ltd., Tls. 80,000, Taiyuenfu, Shansi, established January, 1909, registered August, 1909.

Chi Ming Electric Light Co., Ltd., $300,000, Chengtu, Szechuan, established June, 1909, registered August, 1909.

Kai Ming Electric Light Co., Ltd., $200,000, Swatow, established January, 1907, registered February, 1910.

Yao Ming Electric Light Co., Ltd., $100,000, King-kwei-hsien, Kiangsu, established December, 1909, registered December, 1910.

Foochow Electricity Co., Ltd., $120,000, Foochow, established November, 1910, registered January, 1911.

Sih Chien Telephone Co., Ltd., $20,000, Wusih, established January, 1911, registered January, 1911.

Fukien Telephone Co., Ltd., $45,000, Foochow, established December, 1914, registered March, 1914.

Wuching Telephone Co., Ltd., $10,000, Changchow, Kiangsu, established January, 1914, registered July, 1914.

Chinese Merchants' Electric Light Co., Ltd., $1,800,000, Peking, established September, 1904, registered August, 1914.

Tseng Sun Electric Light Co., Ltd., $100,000, Changchow, Kiangsu, established June, 1913, registered October, 1914.

Che Chuen Electric Light Co., Ltd., $500,000, Chungking, Szechuan, established June, 1908, registered April, 1913.

Kalgan Telephone Co., Ltd., $13,600, Kalgan, established June, 1913, registered May, 1913.

Da Yuen Li Electric Light Co., Ltd., $200,000, Hangchow, Chekiang, established December, 1909, registered February, 1914.

AMOY ELECTRIC LIGHT & POWER SUPPLY CO., LTD., $300,000, Amoy, Fukien, established May, 1912, registered March, 1914.

WU FOONG ELECTRIC LIGHT CO., LTD., $100,000, Changchow, Kiangsu, established June, 1913, registered October, 1914.

NINGPO TELEPHONE CO., LTD., $40,000, Jin-hsien, Chekiang. established March, 1913, registered December, 1914.

TSENG MING ELECTRIC LIGHT CO., LTD., $100,000, Yangchow, Kiangsu, established May, 1913, registered December, 1914.

TUNG LI TELEPHONE CO., $6,000, Kashing, Chekiang, established March, 1914, registered March, 1915.

SHANGHAI CHINESE TRAMWAY CO., LTD., $400,000, Shanghai, established July, 1912, registered April, 1915.

HUNAN ELECTRIC LIGHT CO., LTD., $500,000, Changsha, established May, 1911, registered July, 1915.

TSINAN TELEPHONE CO., LTD., $100,000, Tsinan, established March, 1915, registered July, 1915.

SHANGHAI CHINESE ELECTRIC LIGHT CO., LTD., Tls. 100,000, Shanghai, established October, 1907, registered August, 1915.

SUN MING ELECTRIC LIGHT CO., LTD., $100,000, Chefoo, established January, 1914, registered August, 1915.

SUN MING ELECTRIC LIGHT CO., LTD., $100,000, Chefoo, Shantung, established January, 1914, registered August, 1915.

CHAO KWANG ELECTRIC LIGHT CO., LTD., $100,000, Chao-cheng, Kwangtung, established August, 1914, registered August, 1915.

WUCHANG ELECTRIC LIGHT CO., LTD., $350,000, Wuchang, Hupeh, established January, 1915, registered September, 1915.

KWANG HUA ELECTRIC LIGHT CO., LTD., $250,000, Nanhai, Kwangtung, established February, 1913, registered March, 1916.

SHONCHENG TELEPHONE CO., LTD., 18,000, Shoncheng, Kirin, established September, 1915, registered March, 1916.

CHONGMING ELECTRIC LIGHT CO., LTD., $80,000, Chao-an-hsien, Kwangtung, established September, 1915, registered March, 1916.

KWANMING ELECTRIC LIGHT CO., LTD., Tls. 22,000, Tsingpu, Kiangsu, established January, 1914, registered April, 1916.

KWANG HUA ELECTRIC LIGHT CO., LTD., $250,000, Nanhai, Kwangtung, established February, 1913, registered July, 1916.

TUNG MING ELECTRIC LIGHT CO., LTD., $60,000, Hengyang, Hunan, established September, 1915, registered July, 1916.

HUN YAO ELECTRIC LIGHT & POWER SAWING CO., LTD., $30,000 (local currency), Aichong, Heilungkiang, established March, 1914, registered September, 1916.

SIN KWANG ELECTRICITY SUPPLY CO., LTD., $100,000, Kiangmen, Kwangtung, established January, 1915, registered October, 1916.

WUSHING TELEPHONE CO., LTD., $10,000, Huchow, Chekiang, established October, 1915, registered October, 1916.

CHIENCHOW ELECTRIC LIGHT CO., LTD., $50,000, Chinkiang, Fukien, established December, 1915, registered November, 1916.

DA YUEN LI GAS CO., LTD., $350,000, Hangchow, established December, 1909, registered March, 1917.

KUNG YIH ELECTRIC LIGHT CO., LTD., $30,000, Taishan, Kwangtung, established January, 1916, registered March, 1917.

YAO NAN ELECTRIC LIGHT CO., LTD., $70,000, Sansui, Kwangtung, established May, 1914, registered May, 1917.

HWA PEH ELECTRIC LIGHT & POWER SUPPLY CO., LTD., $350,000, Kalgan, established May, 1914, registered May, 1917.

HWA TAI ELECTRIC LIGHT CO., LTD., $60,000, Shih-ma, Fukien, established May, 1915, registered May, 1917.

WEI TUNG ELECTRIC LIGHT CO., LTD., $50,000, Weiyang, Kwangtung, established February, 1917, registered July 1917.

PU CHAO ELECTRIC LIGHT CO., LTD., $60,000, Sha-tze, Hupeh, established August, 1913, registered July, 1917.

FUTIEN ELECTRIC LIGHT CO., LTD., $100,000, Futien, Fukien, established January, 1917, registered July, 1917.

YINLU ELECTRIC LIGHT CO., LTD., $50,000, Kiukiang, Kiangsi, established February, 1917, registered August, 1917.

PU LING ELECTRIC LIGHT CO., Tls. 60,000, Kaifeng, established October, 1910, registered October, 1917.

HWA KWANG ELECTRIC LIGHT CO., LTD., $100,000, Shaoshing, Chekiang, established April, 1914, registered November, 1917.

PU HWA ELECTRIC LIGHT CO., LTD., $80,000, Wenchow, Chekiang, established April, 1914, registered December, 1917.

LUNGCHEE ELECTRIC LIGHT CO., LTD., $100,000, Lungchee, Fukien, established March, 1916, registered December, 1917.

FOOCHOW ELECTRICITY CO., LTD., $1,200,000, Foochow. established November, 1910, registered December, 1917.

YUNG CHENG HYDRO-ELECTRIC LIGHT CO., $50,000, Yungcheng, Fukien, established June, 1917, registered December, 1917.

CHIENCHOW ELECTRIC LIGHT CO., LTD. $100,000, Chinkiang, Fukien, established December, 1915, registered January, 1918.

HWA KEE TONGSHAN ELECTRIC LIGHT CO., LTD., $150,000, Tongshan, Chili, established March, 1917, registered February, 1918.

LUNGKOW TELEPHONE CO., LTD., $50,000, Lungkow, Shantung, established November, 1917, registered March, 1918.

YUNGCHENG HYDRO-ELECTRIC LIGHT CO., $70,000, Yungcheng, Fukien, established June, 1917, registered April, 1918.

TSINING TELEPHONE CO., LTD., $50,000, Tsining, Shantung, established August, 1917, registered May, 1918.

CHINHSIEN ELECTRICITY CO., LTD., $100,000, Chinhsien, Fengtien, established December, 1917, registered June, 1918.

TSENG YANG ELECTRIC LIGHT CO., LTD., $320,000, Yangchow, Kiangsu, established May, 1913, registered July, 1918.

SUN MING ELECTRIC LIGHT & POWER SUPPLY CO., LTD., $300,000, Yientai, established January, 1914, registered July, 1918.

TAICHONG TELEPHONE CO., $10,000, Taichong, Kiangsu, established May, 1918, registered July, 1918.

LIYANG TELEPHONE CO., $7,000, Liyang, Kiangsu, established March, 1918, registered July, 1918.

YUNG TUNG TELEPHONE CO., $9,600, Ping-hu-hsien, Chekiang, established April, 1918, registered August, 1918.

WUSHING TELEPHONE CO., LTD., $30,000, Huchow, Chekiang, established October, 1915, registered September, 1918.

PINGHU ELECTRIC LIGHT CO., LTD., $50,000, Pinghu-hsien, Chekiang, established April, 1918, registered September, 1918.

POSHAN ELECTRIC LIGHT CO., LTD., $500,000, Poshan, Shantung, established December, 1918, registered December, 1918.

HWA MING ELECTRIC LIGHT CO., LTD., $50,000, Kiangyin, Kiangsu, established May, 1918, registered January, 1919.

SHANHAIKWAN ELECTRIC LIGHT CO., LTD., $80,000, Shanhaikwan, Chili, established November, 1917, registered February, 1919.

PINKIANG TELEPHONE CO., LTD., $120,000, Harbin, established March, 1917, registered February, 1919.

SHANGHAI CHINESE MERCHANTS' ELECTRICITY SUPPLY CO., LTD., $1,000,000, Shanghai, established October, 1917, registered February, 1919.

YAO PING ELECTRIC LIGHT CO., LTD., $500,000, Harbin, established October, 1918, registered March, 1919.

HWA SHING ELECTRICITY CO., LTD., $120,000, Lieu-yuen, Fengtien, established November, 1916, registered March, 1919.

LUNGKOW ELECTRIC LIGHT CO., LTD., $100,000, Lungkow, established October, 1917, registered May, 1919.

CHAO LING ELECTRIC LIGHT CO., LTD., $50,000, Loyang, Honan, established May, 1919, registered May, 1919.

TSENG HENG ELECTRIC LIGHT CO., LTD., $50,000, Liyang, Kiangsu, established December, 1915, registered June, 1919.

PUMING ELECTRIC LIGHT CO., $10,000, Yih-yang, Hunan, established January, 1917, registered June, 1919.

DA MING ELECTRIC LIGHT CO., LTD., $250,000 Hsiangtan, Hunan, established November, 1918, registered June, 1919.

TUNG LI TELEPHONE CO., $24,000, Kashing, Chekiang, established March, 1914, registered August, 1919.

HWA MING ELECTRIC LIGHT CO., LTD., $80,000, Tseng-hai, Chekiang, established December, 1917, registered August, 1919

KWANG YAO ELECTRIC LIGHT CO., LTD., $70,000, Kih-an, Kiangsi, established June, 1918, registered October, 1918.

KWANG MING ELECTRIC LIGHT CO., LTD., $20,000, Shiao-shan, Chekiang, established May, 1919, registered November, 1919.

Yung Yao Electric Light Co., Ltd., $130,000, Ningpu, Chekiang, established February, 1917, registered December, 1919.

Camphor Manufacturing Companies

Pao Shing Heng Camphor Manufacturing Co., Ltd., $100,000, Hankow, established November, 1908, registered June, 1909.

Hwa Chong Camphor Manufacturing Co., $50,000, Kiukiang, Kiangsi, established April, 1919, registered May, 1919.

Tseng Hwa Camphor Manufacturing Co., $3,300, Nee-wu-hsien, Chekiang, established January, 1919, registered November, 1919.

Matches Factories

Sih Chong Matches Factory, $400,000, Hankow, established May, 1896, registered January, 1905.

Sin Lih Matches Factory, $9,500, Kwangshan-hsien, Honan, established November, 1907, registered November, 1908.

Ziang Sun Matches Factory, $100,000, Shanghai, established April, 1908, registered November, 1908.

Tientsin Matches Factory, $30,000, Tientsin, established March, 1909, registered March, 1909.

Hung Chong Matches Factory, $50,000, Hsiang-wu-hsien, Honan, established March, 1910, registered 1910.

Hsong Fo Matches Factory, Tls.12,000, Taiyuenfu, Shansi, established October, 1909, registered August, 1910.

Hsin Ho Matches Factory, $24,000, Luhsien, Szechuan, established December, 1912, registered November, 1912.

Yun Chong Matches Factory, $50,000, Shanghai, established July, 1911, registered January, 1913.

Kwan Tung Matches Factory, $50,000, Yinkow, Fengtien, established May, 1913, registered July, 1913.

Tseng Nih Matches Factory, $200,000, Tsinan, established August, 1913, registered July, 1913.

Wei Shang Matches Factory, $50,000, Linweitseng, Anhwei, established March, 1913, registered December, 1913.

Kih Hsiang Matches Factory, $22,500, Canton, established November, 1910, registered January, 1914.

Wen Ming Matches Factory, $20,000, Canton, established November, 1908, registered February, 1914.

Tai Ho Matches Factory, $6,000, Canton, established May, 1910, registered February, 1914.

Kwang Chung Shing Matches Factory, $6,000, Chengteh, Kwangtung, established December, 1910, registered February, 1914.

Liang Yo Matches Factory, $10,000, Sze-wan-hsien, Kwangtung, established December, 1912, registered February, 1914.

Hwa Sin Matches Factory, $8,000, Nanhai, Kwangtung, established February, 1913, registered February, 1914.

Hei Yu Matches Factory, $30,000, Heichow, Szechuen, established June, 1913, registered April, 1914.

Shan Yih Matches Factory, $21,000, Sanweitseng, Szechuan, established October, 1912, registered May, 1914.

Yat Nee Matches Factory, $15,000, Loshan, Szechuan, established March, 1914, registered August, 1914.

Jui Chong Matches Factory, $30,000, Juining, Szechuan, established April, 1913, registered August, 1914.

Da Chung Matches Factory, Tls. 20,000, Kaifeng, Honan, established September, 1913, registered August, 1914.

Yung Hwa Matches Factory, $80,000, Pucheng, Chili, established May, 1914, registered August, 1914.

Jih Nee Matches Factory, $10,000, Kiangpeh, Szechuan, established June, 1913, registered July, 1915.

Kwang Ming Matches Factory, Tls. 20,000, Kaolanhsien, Kansu, established May, 1914, registered July, 1915.

Tai Feng Matches Factory, $200,000, Peking, established 1905, registered August, 1915.

Shu Nee Matches Factory, $30,000, Kirin, established November, 1914, registered August, 1915.

Chi Yuen Matches Factory, $20,000, Yinkow, Fengtien, established July, 1915, registered September, 1915.

Ho Feng Matches Factory, Tls. 100,000, Changsha, Hunan, established 1896, registered October, 1915.

Kwang Hwa Matches Factory, $100,000, Hangchow, established August, 1915, registered October, 1915.

Yung Chong Matches Factory, $100,000, Sin-chiang, Shansi, established August, 1915, registered October, 1915.

Hing Hwa Matches Factory, $50,000, Shincheng, Kirin, established September, 1915, registered January, 1916.

Jui Chong Matches Factory, $40,000, Chang-an, Shensi, established November, 1915, registered February, 1916

Kuo Kwang Matches Factory, $5,000, Foochow, established January, 1916, registered February, 1916

Chung Foo Matches Factory, $100,000, Chefoo, Shantung, established February, 1916, registered February, 1916.

Hwa Chong Matches Factory, Tls. 150,000, Tientsin, established February, 1911, registered April, 1916.

Tseng Hwa Matches Factory, $40,000, Shih-chia-cheng, Chili, established November, 1915, registered May, 1916.

Yung Chong Matches Factory, $150,000, Pootung, Kiangsu, established July, 1911, registered September, 1916

Pao Wai Matches Factory, Tls. 15,000, Ning-chuan, Shensi, established September, 1911, registered March, 1917.

King Tsing Matches Factory, Tls. 60,000, Ping-yao, Shansi, established December, 1916, registered March, 1917.

Pao Yan Matches Factory, $100,000, Paoting, Chili, established September, 1916, registered May, 1917.

Yih Han Matches Factory, Tls. 10,000, Nancheng, Shensi, established June, 1917, registered May, 1918.

Jui Hwa Matches Factory, $200,000, Hankow, established November, 1917, registered August, 1918.

Lan-hsien Matches Factory, $100,000, Lan-hsien, Chili, established March, 1919, registered April, 1919.

Kwang Hwa Matches Factory, $200,000, Hangchow, established March, 1918, registered January, 1919.

Tai Hwa Matches Factory, $2,000,000, Peking, established March, 1918, registered September, 1918.

Sin Hwa Matches Factory, $60,000, Sin-shang, Honan, established May, 1919, registered October, 1919.

San Ming Matches Factory, $180,000, Yingkow, Fengtien, established September, 1919, registered October, 1919.

Match Stick and Box Manufacturing Companies

Kiu Heng Teh Match Stick Manufacturing Co., Tls. 20,000, Shanghai, established February, 1919, registered July, 1919.

Hing Hwa Match Box & Stick Manufacturing Co., $5,000, Hangchow, established April, 1918, registered December, 1919.

Waterworks

Swatow Waterworks Co., Ltd., $600,000, Swatow, established August, 1906, registered September, 1906.

Canton Waterworks Co., Ltd., $1,500,000, Canton, established November, 1905, registered April, 1910.

Shanghai Waterworks Co., Ltd., Tls. 1,000,000, Shanghai, established October, 1915, registered September, 1916.

Li-ming Waterworks Co., Ltd., Tls. 23,000, Chengtu, Szechuan, established August, 1906, registered September, 1916.

Nanping Waterworks Co., Ltd., $3,000, Nanping-hsien, Fukien, established December, 1918, registered June, 1919.

Salt Refining Companies

Doong Chen Tai Salt Refining Co., Ltd., Tls. 100,000, Tungchow, established 1903, registered August, 1905.

Kiu Dah Salt Refining Co., Ltd., $50,000, Tangku, Chili, established September, 1914, registered December, 1915.

Kiu Dah Salt Refining Co., Ltd., $150,000, Tangku, Chili, established September, 1914, registered August, 1917.

Kiu Dah Salt Refining Co., Ltd., $500,000, Tangku, Chili, established September, 1914, registered November, 1919.

Asbestos Manufacturing Companies

Li Yung Asbestos Products Co., Ltd., $37,000, Chinchow, Fengtien, established December, 1910, registered, 1913.

Tientsin Asbestos Products Co., Ltd., $30,000, Tientsin, established July, 1915, registered January, 1916.

Soda Manufacturing Companies

Mongolia Soda Manufacturing Co., Ltd., $200,000, Kalgan, established December, 1915, registered March, 1916.

Yinshing Gypsum Co., Ltd., $400,000, Yingcheng, Hupeh, established April, 1917, registered September, 1917.

Mongolia Soda Manufacturing Co., Ltd., $200,000, Kalgan, established December, 1915, registered September, 1919.

Mining Companies

Chung Hwa Mining Co., Ltd., $200,000, Da-shing-hsien, Chili, established July, 1919, registered October, 1919.

Continental Mining Co., Ltd., $200,000, Peking, established April, 1918, registered May, 1918.

Coal Mining Companies

Doong Cheng Yu Coal Mining Co., Ltd., $100,000, Changsha, Hunan, established May, 1902, registered August, 1905.

Chung Shing Coal Mining Co., Ltd., $2,000,000, Chao-cheng, Shantung, established 1880, registered November, 1905.

Ping Hsin Coal Mining Co., Ltd., Tls. 170,000, Honai-hsien, Honan, established July, 1902, registered July, 1906.

Lo Hei Kew Coal Mining Co., Ltd., Tls. 340,000, Lo-hei-kew, Honan, established 1903, registered March, 1907.

Sin Cheng Coal Mining Co., Ltd., Tls. 50,000, Chengtehfu, Honan, established March, 1907, registered June, 1907.

Han yeh Ping Coal & Iron Mining Co. Ltd. $20,000,000, Hanyang, Hupeh, established June, 1886, registered March, 1908.

Tsing Yih Coal Mining Co., Ltd., $10,000, Fengtai, Shansi, established September, 1907, registered August, 1908.

Lanchow Coal Mining Co., Ltd., $5,000,000, Kaiping, Chili, established December, 1906, registered March, 1909.

Hung Chong Stone Mining Co., Ltd., $50,000, Chaochow, Yunnan, established February, 1910 registered November, 1910.

Kianghoi Coal & Iron Mining Co., Ltd., Tls. 200,000, Chungking, established February, 1908, registered December, 1909.

Pao Shing Coal Mining Co., Ltd., $100,000, Tunglu, Chekiang, established April, 1910, registered June, 1913.

Pao Foong Coal Mining Co., Ltd., $600,000, Tatung, Shansi, established February, 1913, registered July, 1913.

Chia Hwang Coal Mining Co., Ltd., $2,000,000, Tientsin, established 1908, registered December, 1915.

Tsing Hwa Coal Mining Co., Ltd., $100,000, Wanping, Chili, established April, 1916, registered May, 1916.

Kai Yuen Mining Co., Ltd., $300,000, Peking, established November, 1916, registered January, 1917.

Tse Yang Coal Mining Co., Ltd., $130,000, Nanking, established March, 1918, registered October, 1918.

Liu Kiang Coal Mining Co., Ltd., $720,000, Shanghai, established October, 1918, registered October, 1918.

Hung Sung Coal Mining Co., $117,875, Charhar, established 1906, registered December, 1918.

Tien Lee Yuan Coal Mining Co., Ltd., $150,000, Shantung, established May, 1918, registered January, 1919.

Tseng Foong Coal Mining Co., Ltd., $178,200, Tsin-chiang, Chihli, established September, 1918, registered January, 1919.

Dah Foong Coal Mining Co., Ltd., $520,000, Wei-ping-hsien, Chihli, established January, 1919, registered January, 1919.

Pao Tsing Coal Mining Co., Ltd., Tls. 3,000,000, Ping-Ting-hsien, Shansi, established 1906, registered February, 1919.

Dah Foong Coal Mining Co., Ltd., $260,000, Wei-ping-hsien, established January, 1919, registered March, 1919.

Pu Lao Coal Mining Co., Ltd., $1,000,000, Shanghai, established January, 1919, registered June, 1919.

Chung Woo Coal Mining Co., Ltd., $240,000, Peking, established October, 1913, registered July, 1919.

Ning Shun Coal Mining Co., of Nanking, $200,000, Shanghai, established August, 1918, registered August, 1919.

Metal Mining Companies

She-tai-tze-ker Gold Mining Co., Ltd., Tls. 40,000, Cho-yang, Kuangtung, established August, 1904, registered February, 1905.

Hsian Yue Hsian Chen Mining Co., Ltd., Tls. 100,000, Changsha, Hunan, established December, 1899, registered November, 1906.

Dah Chen Antimony Mining Co., Ltd., Tls. 30,000, Changsha, Hunan, established March, 1898, registered January, 1907.

Tsi Tih Antimony Mining Co., Ltd., Tls. 20,000, Singhua, Hunan, established October, 1907, registered December, 1908.

Hua Chang Metals Mining Co., Ltd., $300,000, Changsha, Hunan, established February, 1908, registered March, 1909.

Pao Zai Antimony Mining Co., Ltd., Tls. 10,000, Singhua, Hunan, established March, 1910, registered April, 1910.

Sui Shen Brass Mining Co., Ltd., $100,000, Peking, established November, 1914, registered May, 1915.

Yue Ching Manganese Mining Co., Ltd., Tls. 30,000, Pang-chen, Kuangtung, established January, 1914, registered October, 1915.

Yue Hua Gold Mining Co., Ltd., $100,000, Tientsin, established April, 1914, registered October, 1916.

Lung Yen Iron Mining Co., Ltd., $5,000,000, Peking, established March, 1919, registered December, 1919.

Hua Chang Metals Mining Co., Ltd., $1,500,000, Changsha, Hunan, established February, 1908, registered October, 1918.

Hua Chang Antimony Mining Co., Ltd., $200,000, Singhua, Hunan, established March, 1915, registered October, 1917.

Tobacco Companies

Pei-yang Tobacco Co., Ltd., Tls. 105,000, Tientsin, established December, 1902, registered October, 1904.

San Sing Tobacco Co., Ltd., Tls. 100,000, Shanghai, established November, 1905, registered November, 1905.

Tobacco Co. of China, Ltd., Tls. 30,000, Shanghai, established May, 1906, registered April, 1907.

Yue Tung Tobacco Co., Ltd., $50,000, Canton, established December, 1905, registered August, 1906.

Foh Hua Tobacco Co., Ltd., Tls. 15,000, Shia-kow, Hupeh, established June, 1906, registered August, 1906.

Hung Lee Tobacco Co., Ltd., $50,000, Fooshan, Shantung, established May, 1906, registered November, 1906.

Sze Ming Tobacco Co. of China, $100,000, Shanghai, established September, 1906, registered November, 1906.

Chung An Tobacco Co., Ltd., Tls. 20,000, Fooshan, Shantung, established November, 1906, registered December, 1906.

Ling Kee Tobacco Co., Ltd., $80,000, Tientsin, established August, 1908, registered August, 1908.

Mei Nih Tobacco Co., $6,000, Lichen, Shantung, established January, 1913, registered September, 1915.

Nanyang Bros. Tobacco Co., $1,000,000, Hongkong, established, 1907, registered December, 1915.

Yue Hua Tobacco Co., Ltd., $50,000, Tsinan, Shantung, established May, 1913, registered December, 1915.

Wu Shun Tobacco Co., of China, $50,000, Tientsin, established April, 1916, registered May, 1917.

Sung Sung Tobacco Co. Ltd., $39,000, Shanghai, established March, 1917, registered October, 1917.

NANYANG BROS. TOBACCO CO., LTD., $5,000,000, Shanghai, established March, 1918, registered October, 1918.

SHUN NIH TOBACCO CO. OF CHINA, $200,000, Shanghai, established December, 1918, registered June, 1919.

TSENG HUA TOBACCO CO. OF CHINA, LTD., $10,000, Shanghai, established May, 1919, registered August, 1919.

Egg Products Companies

HUNG MOW YUAN EGG PRODUCTS CO., Tls. 10,000, Dao-yuan, Kiangsu, established January, 1911, registered January, 1911.

HUNG YUE CHANG EGG PRODUCTS CO., Tls. 80,000, Dong-shan, Kiangsu, established February, 1917, registered August, 1917.

DAH CHANG EGG PRODUCTS CO., LTD., $100,000, Kaifeng, Honan, established January, 1919, registered August, 1919.

TSENG SING EGG PRODUCTS CO., $60,000, Hwai-ying, Kiangsu, January, 1919, registered December, 1919.

Ice Making Companies

KWANGTUNG ICE MAKING CO., LTD., $100,000, Canton, established September, 1910, registered July, 1911.

KUNG SHUN ICE MAKING CO., $2,000, Soochow, established February, 1907, registered May, 1907.

AMOY ICE MAKING CO., LTD., $20,000, Amoy, Fukien, established January, 1917, registered March, 1919.

Hemp Bag Manufacturing Companies

VAN SHUN HEMP BAG MANUFACTURING CO., LTD., $300,000, Tientsin, established November, 1912, registered June, 1914.

Liquor and Wine Companies

HUA NGAO BEER MANUFACTURING CO., LTD., $100,000, Tientsin, established February, 1909, registered January, 1909.

HUNG YUAN WINE CO., LTD., $100,000, Liao-yuan-chow, Fengtien, established December, 1910, registered December, 1910.

CHANG YUE WINE CO., LTD, $2,000,000, Chefoo, Shantung, established September, 1895, registered December, 1913.

NU-CHIEN-SHAN BEER AND AERATED WATER CO., LTD., $110,000, Peking, established October, 1913, registered June, 1914.

SHUN CHAO WINE CO., LTD., $20,000, Tsinan, Shantung, established 1913, registered January, 1919.

Nitric Acid and Bleaching Powder Companies

CHANG NIH NITRIC ACID & BLEACHING POWDER MANUFACTURING CO., $2,000, Tsinan, Shantung, established November, 1918, registered December, 1918.

Canned Goods Companies

YEE WOO CANNED GOODS CO., LTD., $10,000, Changchow, Kiangsu, established April, 1907, registered July, 1907.

MEI LOO CANNED GOODS CO., LTD., $30,000, Ming-hsien, Fukien, established July, 1910, registered November, 1910.

KAO LEE CANNED GOODS CO., LTD., $50,000, Ping-yang, Chekiang, established February, 1911, registered February, 1911.

DAH TUNG CANNED GOODS CO., LTD., $160,000, Amoy, established October, 1913, registered June, 1914.

DAO HUA CANNED GOODS CO., LTD., $150,000, Amoy, Fukien, established 1907, registered July, 1914.

CHUNG HUA YAH KEE BISCUIT CO., LTD., $2,000, Pao-shan, Kiangsu, established May, 1916, registered May, 1917.

TUNG YAR CANNED GOODS CO., LTD., $20,000, Chefoo, Shantung, established October, 1916, registered May, 1917.

TAI FONG CANNED GOODS CO., LTD., $300,000, Shanghai, established May, 1906, registered August, 1917.

Bean-Curd Manufacturing Companies

PARIS BEAN-CURD MANUFACTURING CO., LTD., $1,200,000, Paris, France, established October, 1910, registered November, 1910.

International Trading Company	1	4	5
Industrial Company	1	11	12
Printing Offices	15	10	25
Soap and Candle Manufacturers	15	12	27
Sugar Refiners	1	1	2
Candle-wick Manufacturers	—	1	1
Steamship Navigation Company	20	54	74
Rattan Sedan Company (new style)	—	8	8
Ricsha Company	—	2	2
Sailing Vessel Company	—	3	3
Railway Transportation Company	2	1	3
Automobile Transportation Company	—	3	3
Metals Company	2	8	10
Rice Grinding Mills	6	3	9
Flour Mills	16	46	62
Rice Grinding and Flour Mills	3	1	4
Paper Mills	3	4	7
Oil Mills	9	6	15
Tile and Brick Plants	7	3	10
Pottery Company	8	2	10
Glass Manufacturers	1	3	4
Cement Plants	3	1	4
Leather Manufacturers	4	3	7
Reclamation Company	30	41	71
Filatures and Weaving Company	68	72	140
Electric Plants	12	74	86
Drug Stores	13	11	24
Camphor Company	1	2	3
Pawn Shops	18	2	20
Godowns	—	2	2
Insurance Company	7	11	18
Native Banks	9	1	10
Banks	11	17	28
Trust Co., Stock and Produce Exchanges	—	3	3
Match Manufacturers	7	42	49
Match Stalk and Box Manufacturers	—	2	2
Building Constructors	13	7	20
Dress Makers and Outfitters	2	5	7
Gold Ornaments Stores	2	—	2
Optical Company	—	3	3
Timber Yards	—	10	10
Waterworks	2	3	5
Salt Company	3	4	7
Dye Stuff Company	4	1	5
Asbestos Company	—	2	2
Alum, Gypsum, etc., Plants	2	4	6
Perfumery, Tooth-powder, etc., Stores	2	3	5
Mining Company	—	2	2
Coal Company	11	17	28
Minerals Company	6	6	12
Tobacco Company	10	8	18
Irrigation Company	2	7	9
Cotton and Cereals Store	2	—	2
Egg Products Company	1	3	4
Ice-making Factory	2	1	3
Petroleum Plant	4	—	4
Paper Dealer	1	1	2
Miscellaneous Stores	21	19	40
Express Company	—	8	8
Coal Transport Company	3	3	6
Tea Company	2	2	4
Wine Company	3	3	6
Acids End Bleaching Powder Factory	—	1	1
Canned Goods Company	3	6	9
Bean Curd Company	1	—	1

CHIENMEN

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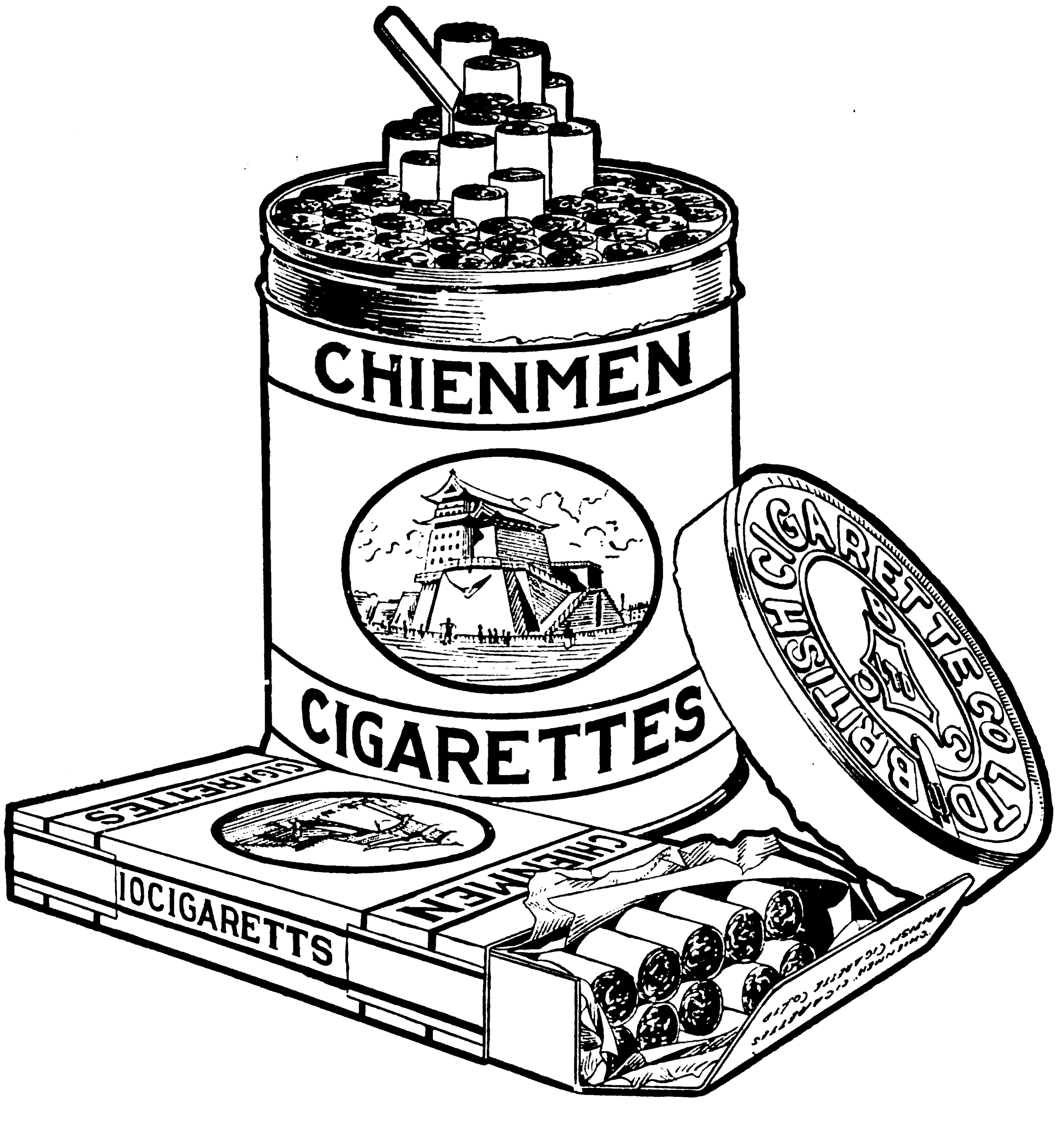

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An Analysis of the Pacific Problem

A SOLUTION

Vol. XVII November, 1921 No. 11

A. L. TAYLER.

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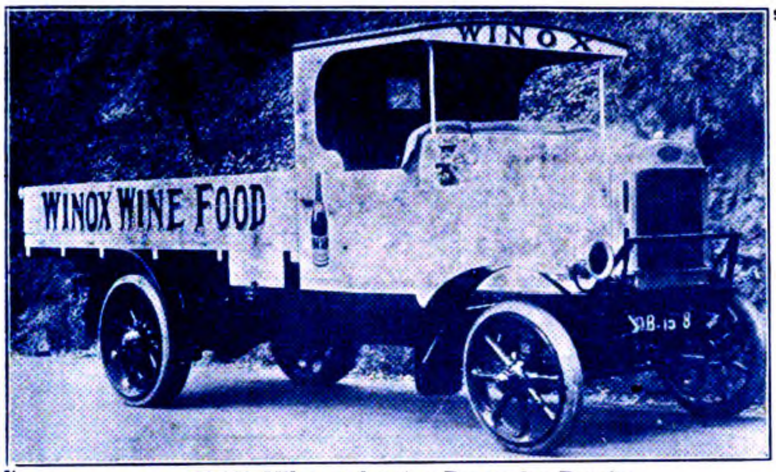

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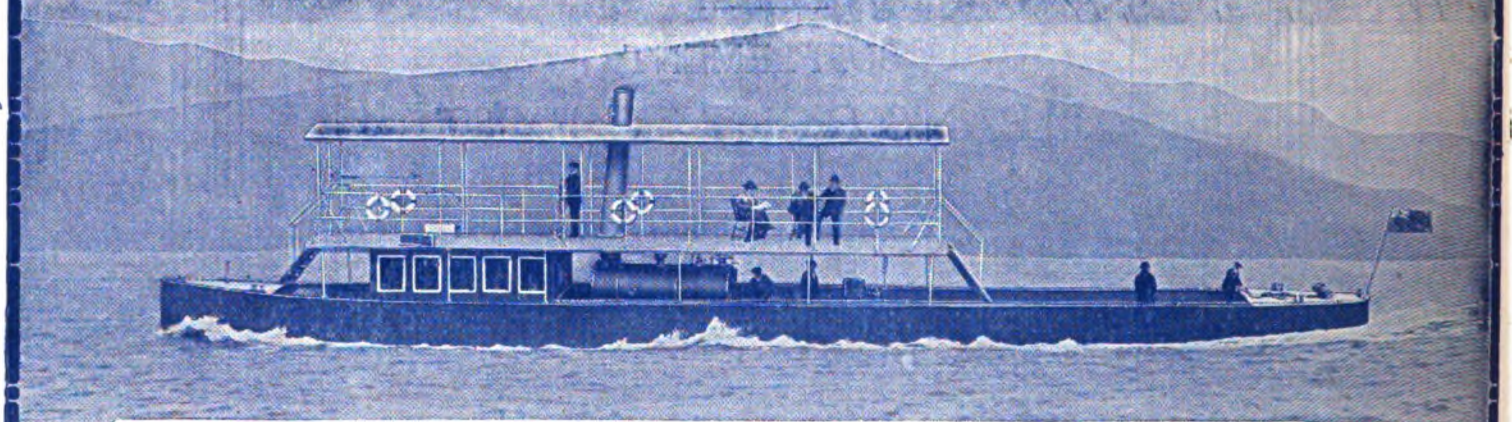

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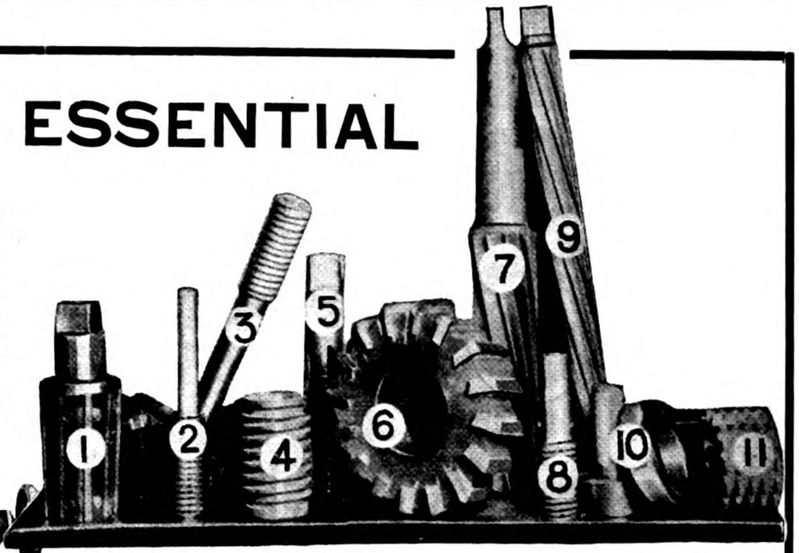

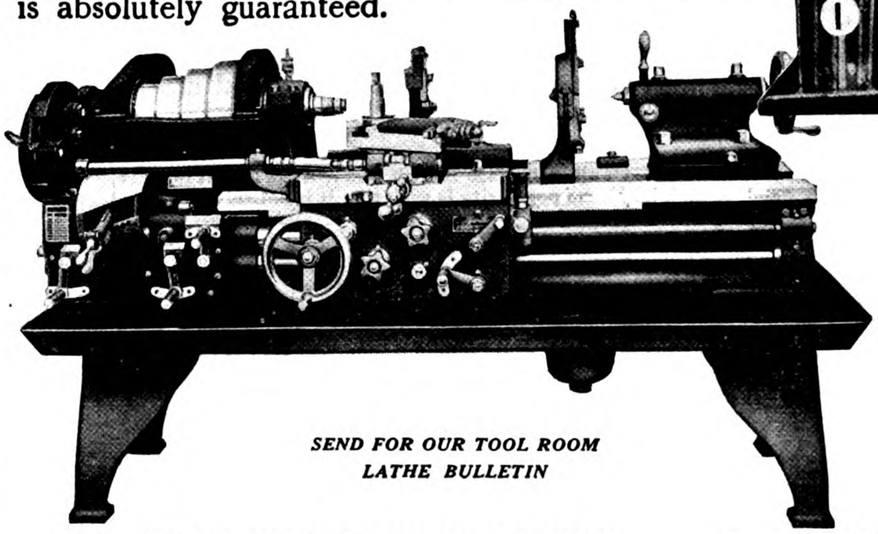

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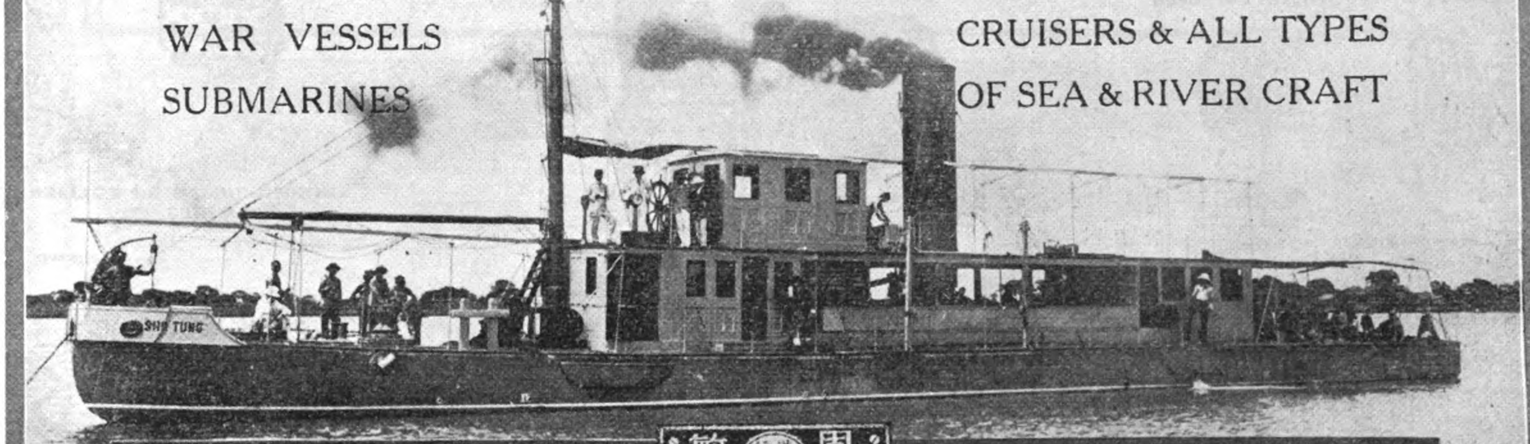

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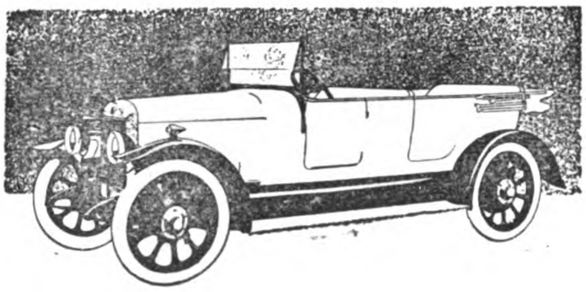

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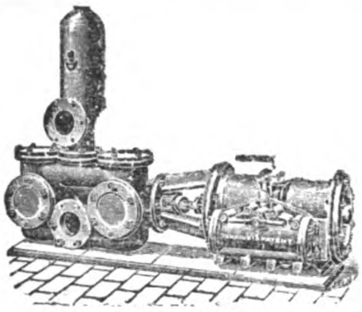

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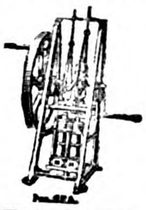

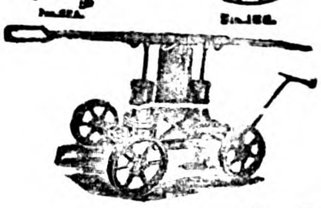

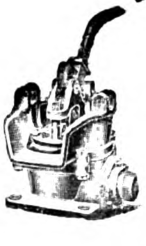

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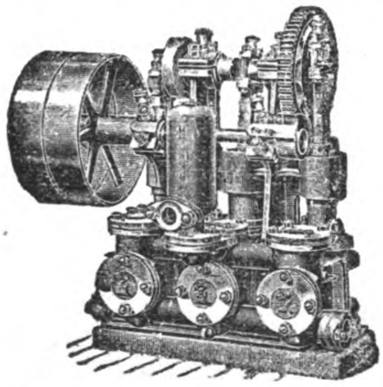

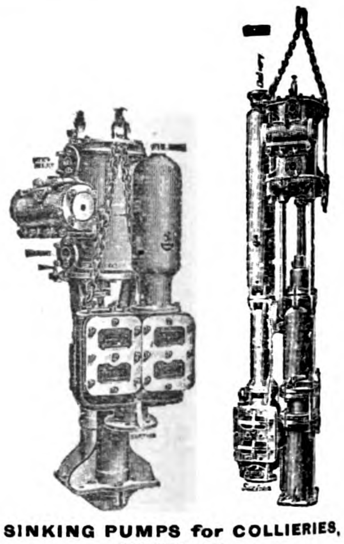

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Fig. 191.

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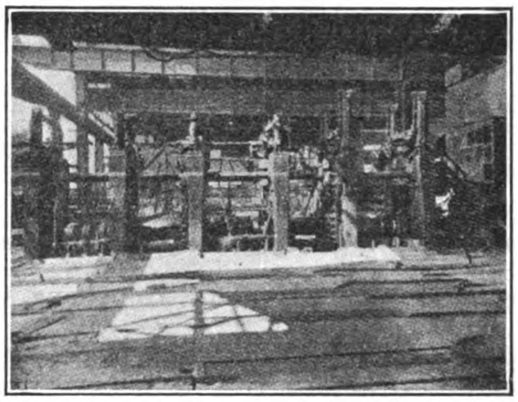

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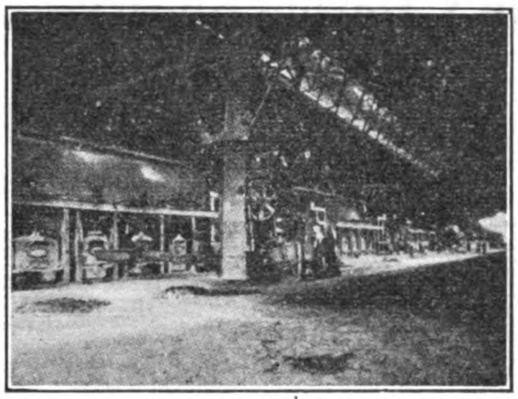

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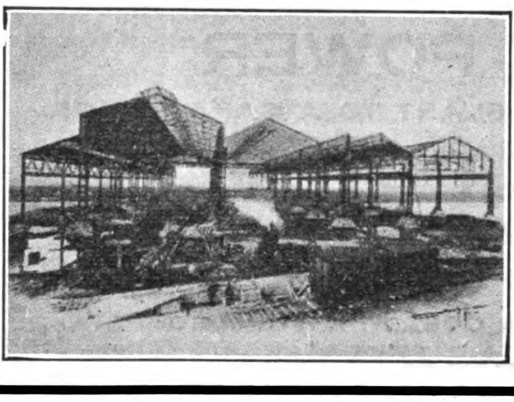

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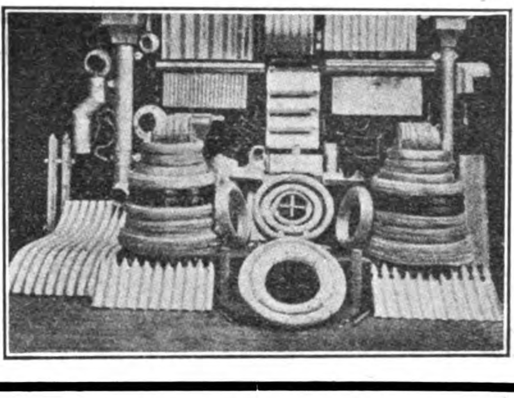

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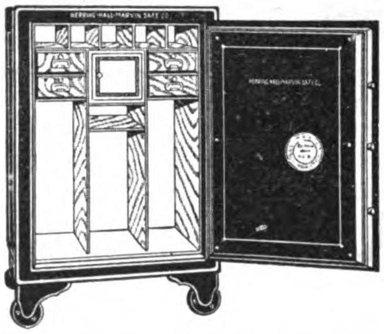

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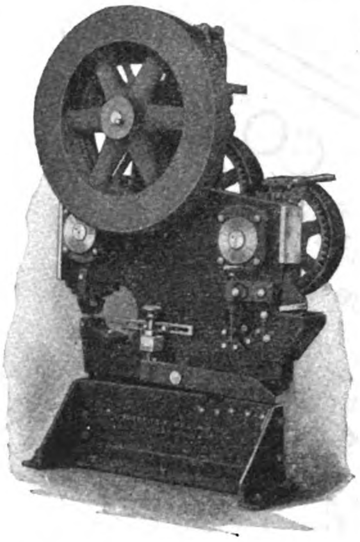

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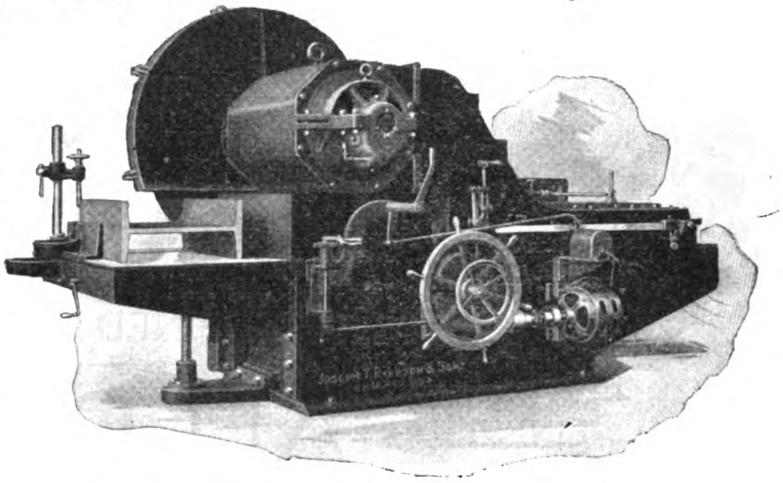

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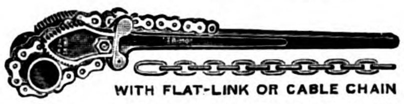

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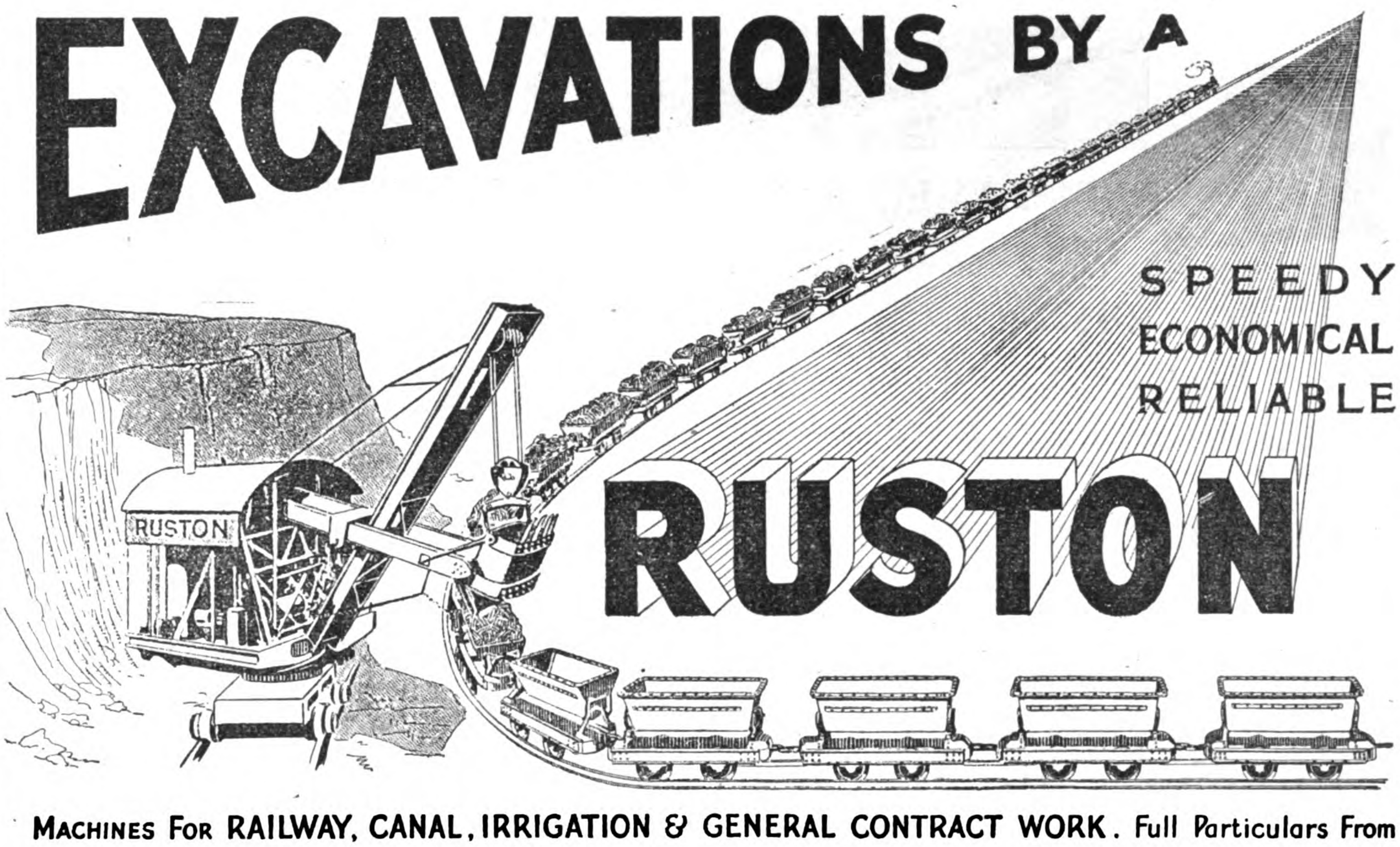

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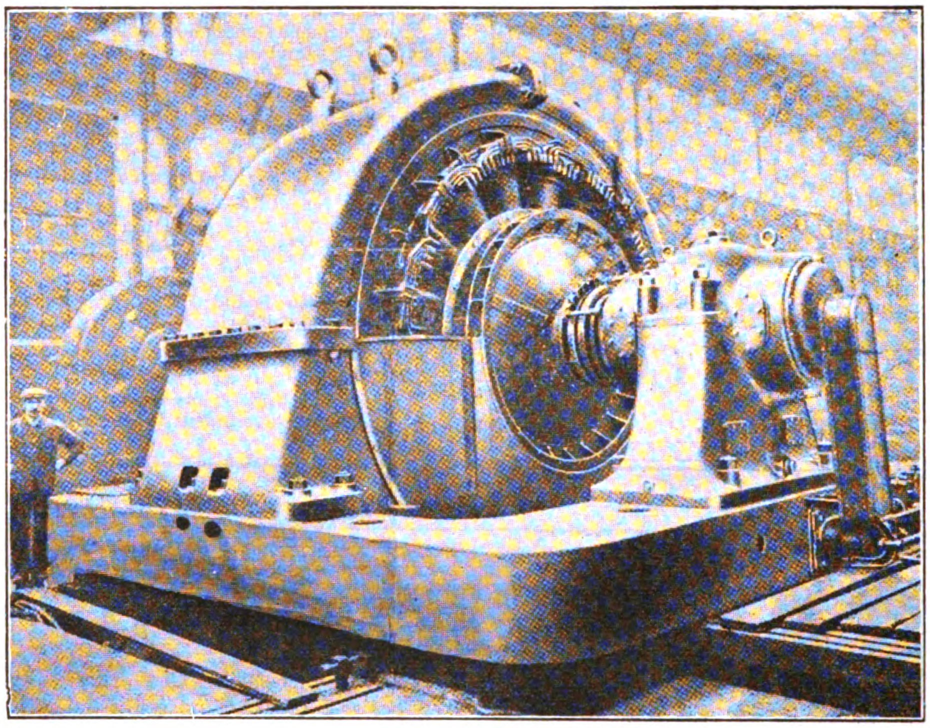

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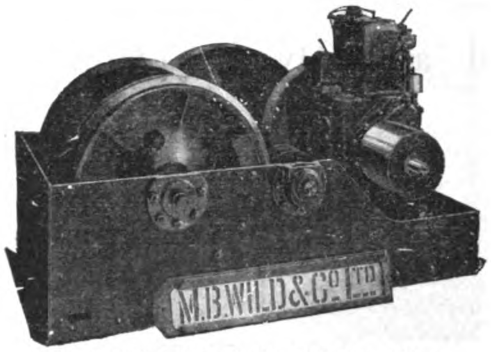

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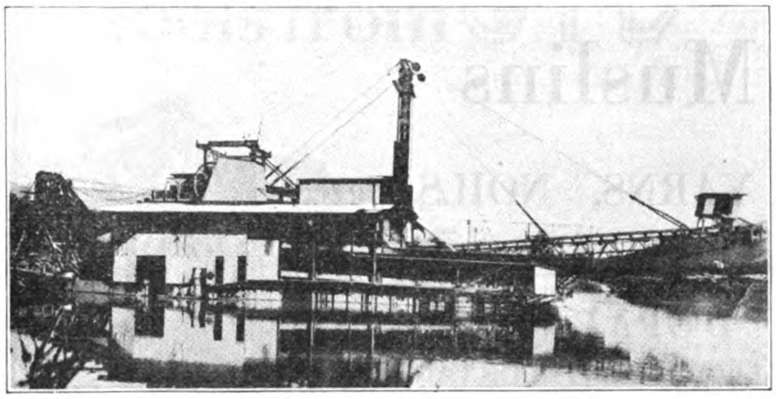

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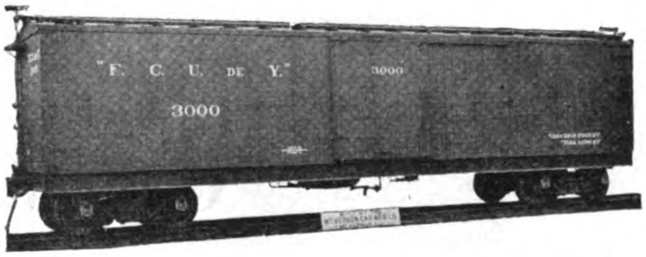

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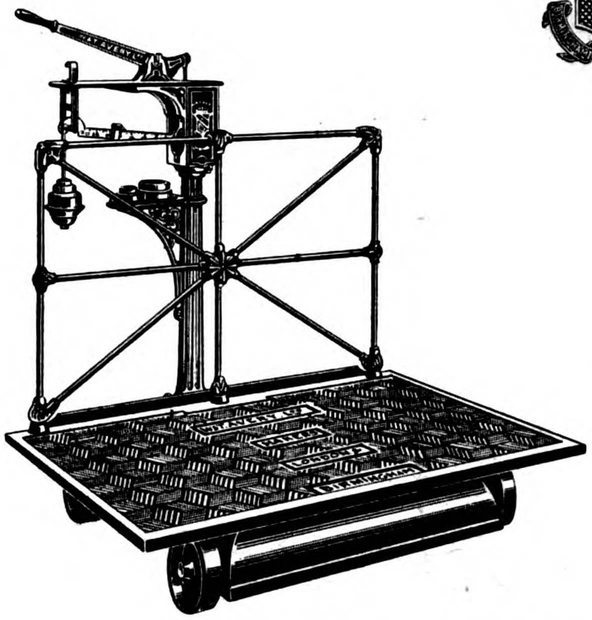

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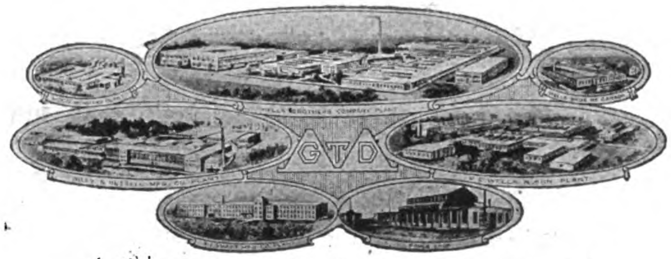

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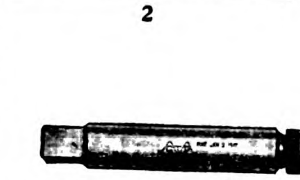

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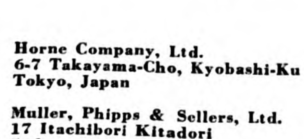

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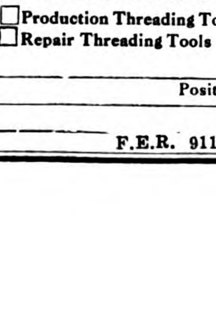

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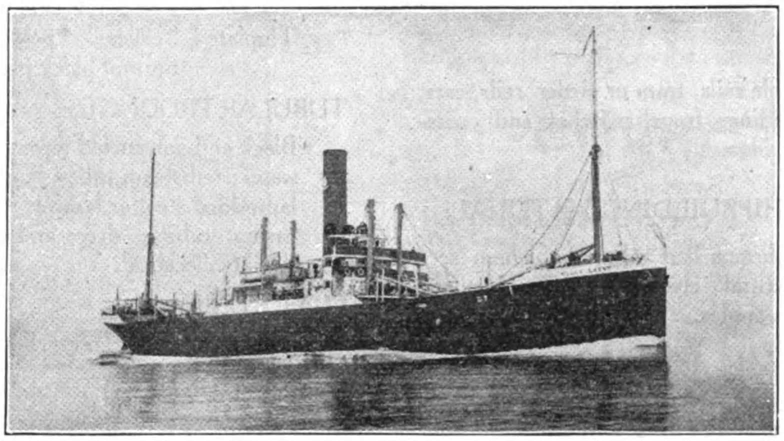

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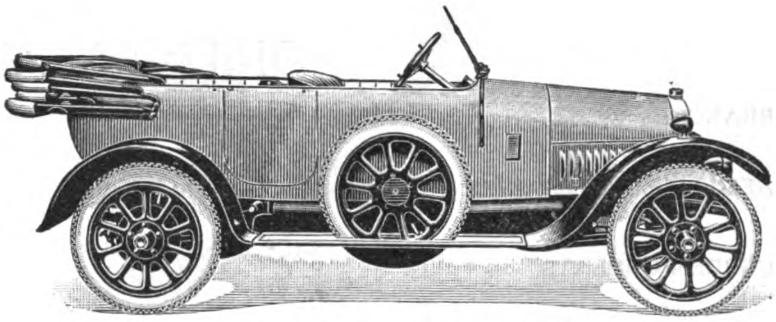

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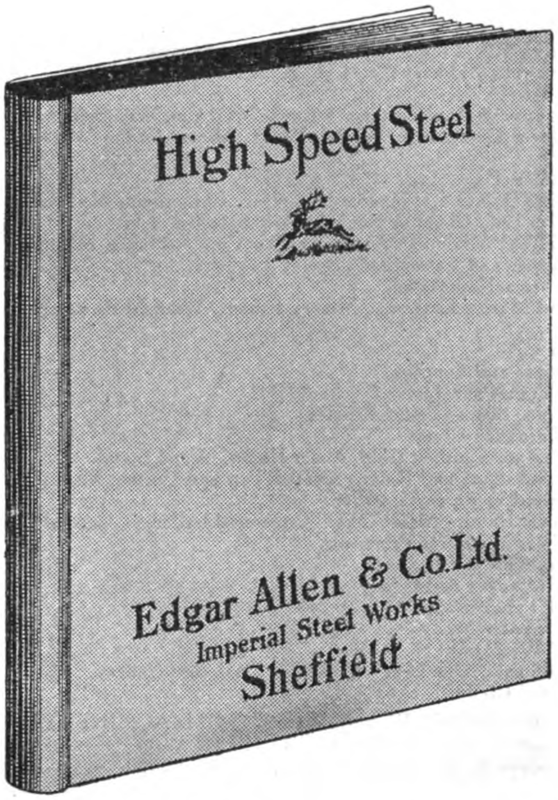

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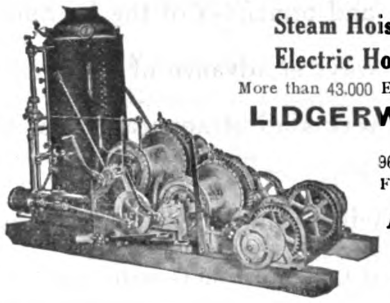

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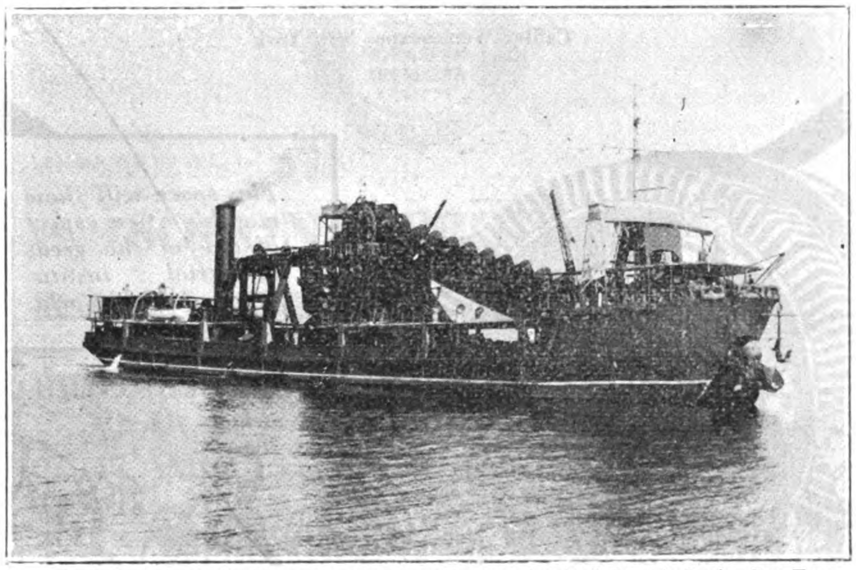

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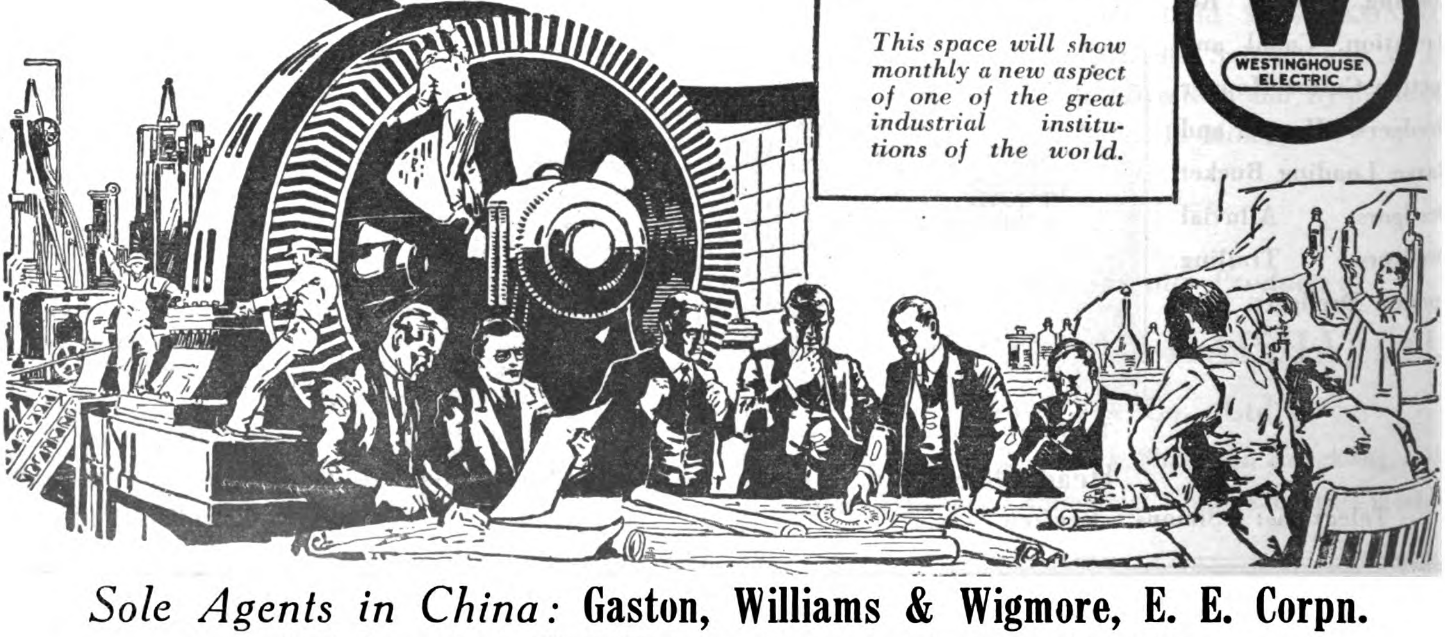

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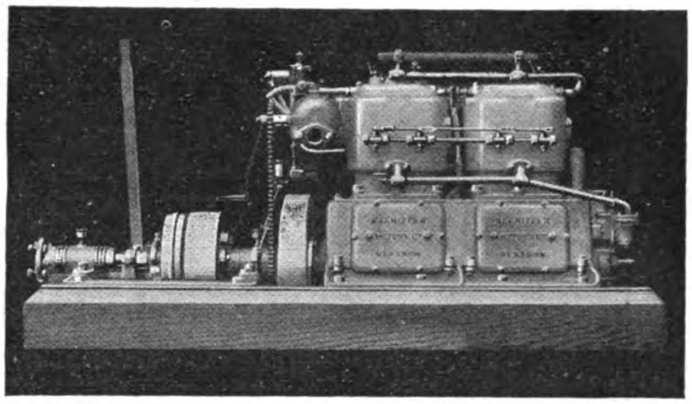

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TERNE PLATES
TIN MILL PRODUCTS
TIN PLATE—"Coke," "Charcoal" and "Terne"
TOOL STEEL
TOWERS—Steel
TRIANGLE MESH CONCRETE REINFORCEMENT
TUBES—Gas, Water, Steam
TURNTABLES FOR LIGHT AND HEAVY RAILWAY SERVICE
UPHOLSTERY SPRINGS
WASHERS
WEATHERPROOF INSULATED TELEPHONE AND SIGNAL WIRE
WHEELS—Solid Wrought Steel for Steam, Electric, Mine and Industrial Railways
WIRE PRODUCTS—Plain, Galvanized, Bright Hard, Bright Soft, Baling and Fencing. All Classes of Coated and Uncoated for Manufacturing Purposes

The Combined Actual Annual Ingot Production of our Manufacturing Companies for the year 1920 was in excess of 19,000,000 tons.

SHANGHAI OFFICE
Union Building—The Bund and Canton Road

TOKYO OFFICE
No. 15 Nakadori, Marunouchi

OKURA & CO. (TRADING) LTD.

No. 2 Canton Road, Shanghai

President:
Baron K. Okura

BRANCHES at Hakodate, Yokosuka, Yokohama, Osaka, Kobe, Maizuru, Kure, Moji, Saseho, Keelung, Taihoku, Seoul, Antung, Penhsihu, Mukden, Tientsin, Peking, Hankow, Changsha, Kiukiang, Tsingtau, Hongkong, Vladivostok, Sydney, San Francisco, New York, London.

Head Office:
Ginza, Tokio

GENERAL IMPORTERS AND EXPORTERS

Agents for

Akita Lumber Co., Ltd.
Toyo Marine Insurance Co., Ltd.
Pen-Hsi-Hu Coal and Iron Mines, Ltd.
Norwich Union Fire Insurance Society, Ltd.
Nippon Conscription and Survivorship Insurance Co., Ltd.
Chiyoda Mutual Life Assurance Co., Ltd.
Niitaka Sugar Refining Co., Ltd.
Nippon Tannery Co., Ltd.
Nippon Buttery Co., Ltd.
Yalu Lumber Co., Ltd.

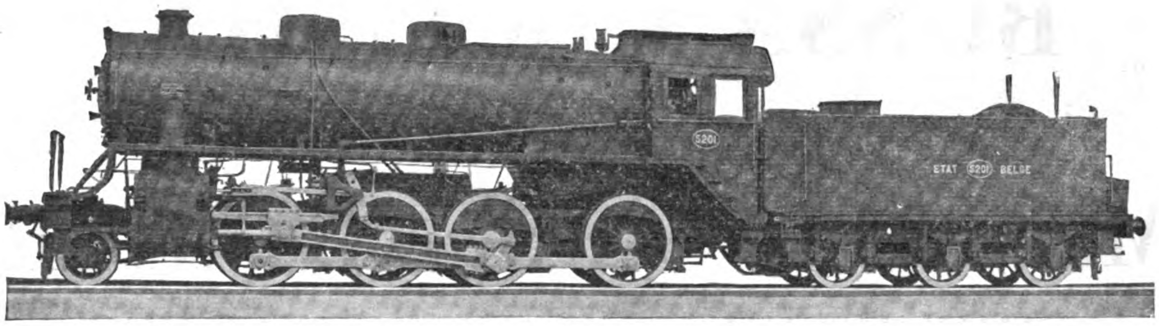
IMPORTS AND EXPORTS

PIECE GOODS, SUGAR, ELECTRIC FITTINGS, COTTON, MACHINERY, MARINE PRODUCTS, FERTILIZERS, CEREALS AND PULSE, COAL, CHEMICALS, HIDES, FLOUR, TIMBER, YARN, METALS, OILS, WOOL, ORES, PIG IRON, ETC.

Yih Chong Wharf (Okura)

POOTUNG, SHANGHAI

AN UNUSUAL TRIBUTE



BUILT FOR THE BELGIAN GOVERNMENT

Total Weight of Engine, 188,000 pounds; Weight on Driving Wheels, 167,000 pounds; Diameter of Driving Wheels, $59\frac{7}{8}$ inches; Boiler Pressure, 200 pounds; Cylinders, 24 × 28 inches; Maximum Tractive Power, 35,000 pounds.

An unusual tribute to the locomotives supplied to the Belgian Government by the United States builders recently appeared in the Belgian official publication—"Chronique des Travaux Publics."

The following are extracts from this article :—

"The American locomotives measure up to the most optimistic expectations, inasmuch as we are using them on the Luxembourg line, the hardest division of our railways—and all are giving the best of service.

"The good quality of the American engine is proved by the significant fact that they are used in passenger service.

"The most important part of the locomotive—the boiler—is perfect.

"In a word, the American locomotives are giving entire satisfaction. They conform to the technical requirements imposed and they have to-day already given considerable service."

AMERICAN LOCOMOTIVE SALES CORPORATION

Export Sales Agents for

AMERICAN LOCOMOTIVE COMPANY

AND

MONTREAL LOCOMOTIVE WORKS, LIMITED

30 CHURCH STREET, NEW YORK, U. S. A.

CABLE ADDRESS: "LOCOMOTIVE," NEW YORK

RESIDENT TECHNICAL REPRESENTATIVE

CHINA: PEKING—F. M. Titus, International Banking Corporation

MITSUI BUSSAN KAISHA

Cable Address: "MITSUI"

Capital: Yen 100,000,000
Reserve: „ 30,000,000

LIMITED

MITSUI & CO., LTD. (IN EUROPE AND AMERICA)

IMPORTERS AND EXPORTERS

SHIPOWNERS AND SHIPBUILDERS

Head Office: TOKYO, JAPAN

Branches:

HOME—Yokohama, Nagoya, Osaka, Kobe, Otaru, Muroran, Hakodate, Niigata, Moji, Wakamatsu, Kuchinotsu, Nagasaki, Karatsu, Miike, Taipeh, Keelung, Tainan, Takow, etc., etc.

ABROAD—London, Marseilles, Lyon, Hamburg, New York, San Francisco, Seattle, Portland, Ore, Buenos-Aires, Manila, Bombay, Karachi, Calcutta, Singapore, Bangkok, Rangoon, Soerabaya, Batavia, Semarang, Sydney, Melbourne, Hongkong, Canton, Amoy, Foochow, Shanghai, Chefoo, Hankow, Changsha, Newchwang, Tientsin, Dairen, Antunghsien, Mukden, Tieling, Chungchun, Vladivostok, Harbin, Seoul, Chemulpo, Fusan, etc , etc.

SHIPBUILDERS, ENGINEERS AND REPAIRERS SHIPYARDS AND DRYDOCKS AT TAMA, OKAYMA, JAPAN, For Construction and Repairing

PRINCIPAL LINES OF BUSINESS:

EXPORT.

Raw Silk and Silk Textiles, Coal, Lumber, Rice, Seeds, Beans, Flour, and Other Cereals, Sugar, Copper and other Metals, Vegetable and Wood Oils, Camphor, Matches, Fertilizers, Paper, Canned Foods, Fish Products, Tea, Sulphur, Cement, etc , etc.

IMPORT.

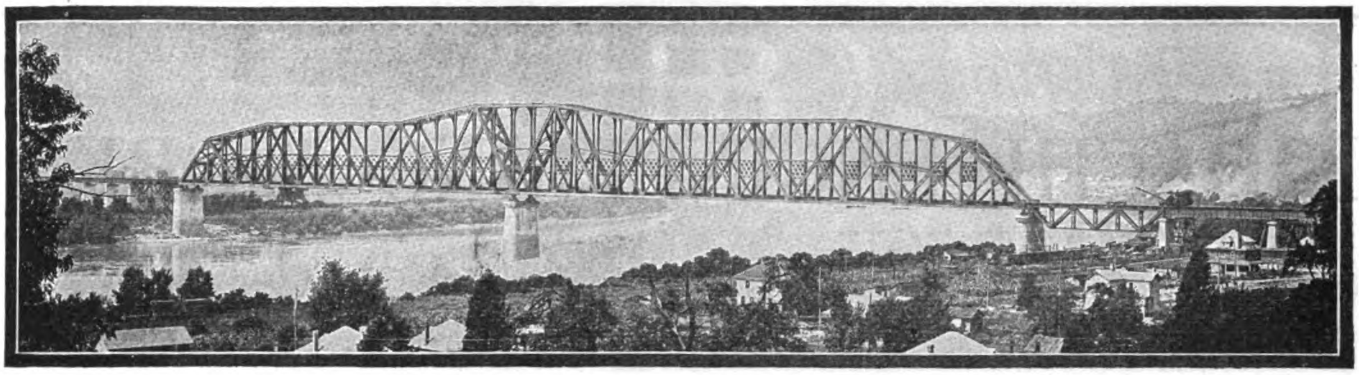
Machinery and Tools, Ships, Steel and Iron, Locomotives, Rails and other R. R. Equipment, Sugar, Rice, Wool, Phosphate, Sulphate of Ammonia, Nitrate of Soda, Rubber, Dyes, Drugs and Chemicals, Jute and Gunnies, Flax and Hemp, Wheat, Seeds, and other Cereals, Bean Cakes, Lumber, etc., etc.

ENGINEERING DEPARTMENT

Sole Agents for Leading American and European Makers, including

American Locomotive Co.
Bucyrus Co.
California National Supply Co.
De La Vergne Machine Co.
General Electric Co.
General Motors Export Co.
Manning Maxwell & Moore, Inc.
Mesta Machine Co.
Nordberg Manufacturing Co.
Sullivan Machinery Co.
Belliss & Morcom, Ltd.
Geo. Cradock & Co., Ltd.
Platt Brothers & Co., Ltd.
Ruston & Hornsby, Ltd., etc. etc.

Also, AGENTS IN JAPAN, ORIENT, and INDIA for Well-known Japanese Insurance Cos.



Sciotoville Bridge at Sciotoville, Ohio, U.S.A., constructed by McClintic-Marshall Company.

The past accomplishments of the McClintic-Marshall Products Company create a feeling of confidence among those who contemplate steel construction of any kind.

This organization has completed major structures in every field of industry throughout the world. It undertakes its problems with confidence based upon an intimate knowledge of engineering requirements.

The McClintic-Marshall Products Company maintains five complete manufacturing plants and is prepared to meet specifications and insure prompt delivery of material.

We Design, Manufacture and Erect
Steel Industrial Plants
Railroad and Highway Bridges
Lock Gates
Blast Furnace Plants
Steel Storage Tanks
Riveted Steel Pipe
Steel Transmission Towers
Steel Ships and Barges
Oil Refining Plants
Gas Plants and Gas Holders
Ore Bridges
Etc.
McClintic-Marshall
Annual Capacity, 400,000 Tons

Write for free booklet No. 402

McClintic-Marshall Products Company

FACTORIES: PITTSBURGH, U. S. A.

Foreign Contract Dept: 50 Church Street, NEW YORK, U. S. A.

LONDON: 25 Victoria Street, S.W. 1.

PARIS: Produits Métallurgiques McClintic-Marshall, 8 Rue Edouard VII

MADRID: Hispano-American Corporation.

YOKOHAMA: H. E. Root, 50a Yamashita-cho 4.

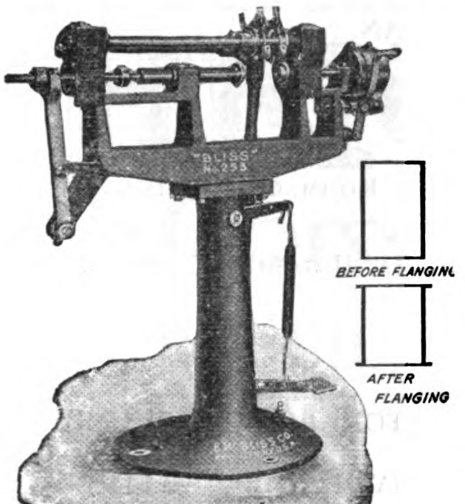
HAVANA: San Ignacio y Obrapia

Cable Address: "Macmarsh" NEW YORK. Codes: Bentley's
General
Western Union Five Letter
Lieber Five Letter

McClintic-Marshall
Steel Construction

FROM THE TIN PLATE TO THE FINISHED CAN

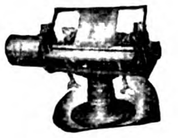
THE FLANGER



No. 253—"Bliss" Flanger

SHEAR
This cuts the tin plate into strips.

PRESS
This blanks out tops and bottoms.



ROLL FORMER
This rolls the bodies to cylindrical shape.

SOLDERING FRAME and CYLINDER
This solders the side seams.

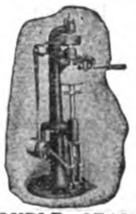
After the can bodies have been properly formed and soldered (see previous advertisements of this series), they are ready to be flanged on the ends (see machine and operation at left). This is a very important operation, since insecure sealing will result from improper flanging.

The "BLISS" double-end FLANGER rapidly and neatly flanges both ends of the can body. It does this by bending out the edges at right angles, so as to prepare for the double seaming of top and bottom. No other machine made surpasses the "Bliss" Flanger for this important operation.

Do not overlook this series, and especially, watch for the next advertisement which will illustrate the sixth and last operation.

"BLISS" Can Making Machinery (one series shown at right) is suitable for making cans of all kinds and tin packages for every purpose. **With your inquiries always send samples and state daily output desired.**

FLANGER
This flanges both ends of can bodies.



DOUBLE SEAMER
This attaches bottoms and tops.

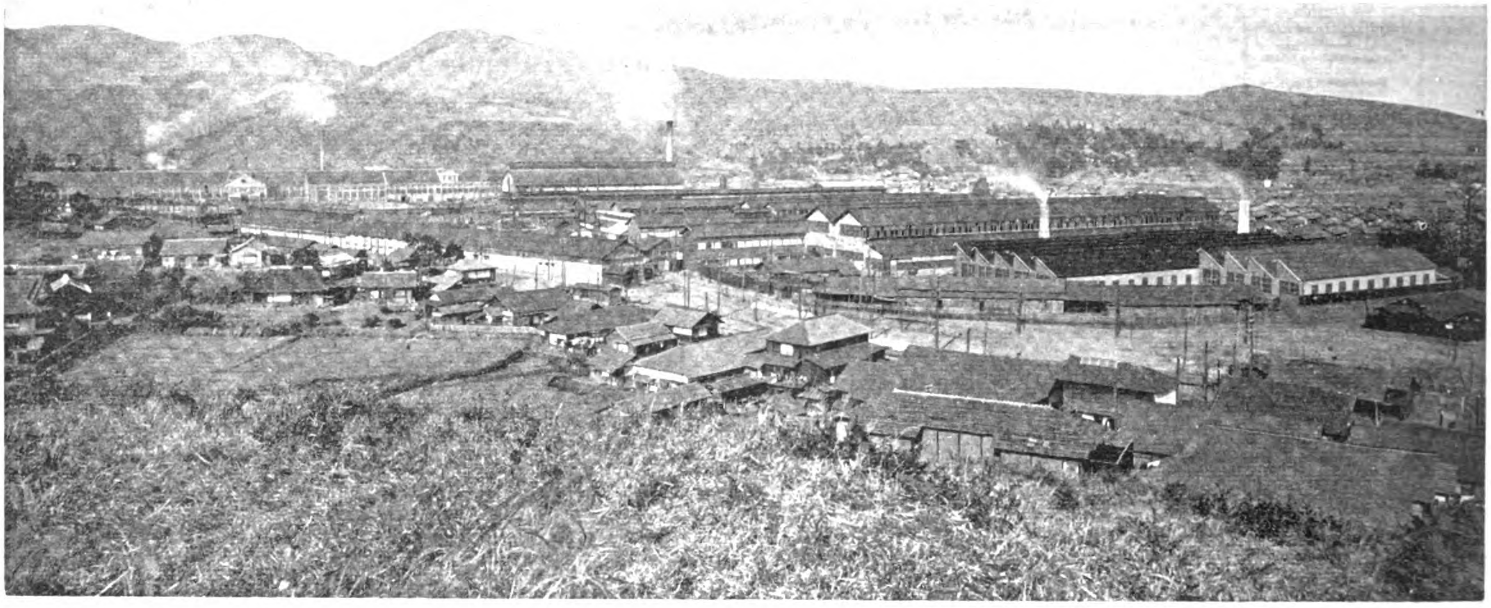
E. W. BLISS COMPANY

22 JOHN ST., BROOKLYN, N.Y., U.S.A.

Presses, Dies and Machinery for the Sheet Metal Industry in general. Complete plants for the manufacture of Metal Boxes, Sanitary Cans of all shapes and sizes, Kitchen Utensils, Petroleum Cans, etc. Complete automatic equipment for making tin cans from tin plate in one continuous operation.

London, England—Pocock St., Blackfriars Road Paris, France—100 Boulevard Victor Hugo, St. Ouen

HIDACHI ENGINEERING WORKS



GENERAL VIEW OF HIDACHI ENGINEERING WORKS

Location of Plant:

SUKEGAWA, IBARAKI PREFECTURE, JAPAN.

Sales Departments:

KUHARA MINING COMPANY OFFICES, 1 ITCHOME, YAESUCHO, KOJIMACHI-KU, TOKYO.

KUHARA MINING COMPANY OFFICES, 90 NICHOME, KITAHAMA, HIGASHI-KU, OSAKA.

Articles Manufactured:

DYNAMOS, ELECTRIC MOTORS, TRANSFORMERS, DISTRIBUTOR PLATES, TURBINE PUMPS, CRANES, WINCHES, AND VARIOUS KINDS OF HYDRAULIC WHEELS.

Also Agents for Hoden Oil, Used for Transformers.

STEAM CRANE EXCAVATORS
with quadrant gear for manipulating Bucket Arm

Prompt Attention given to all Orders.

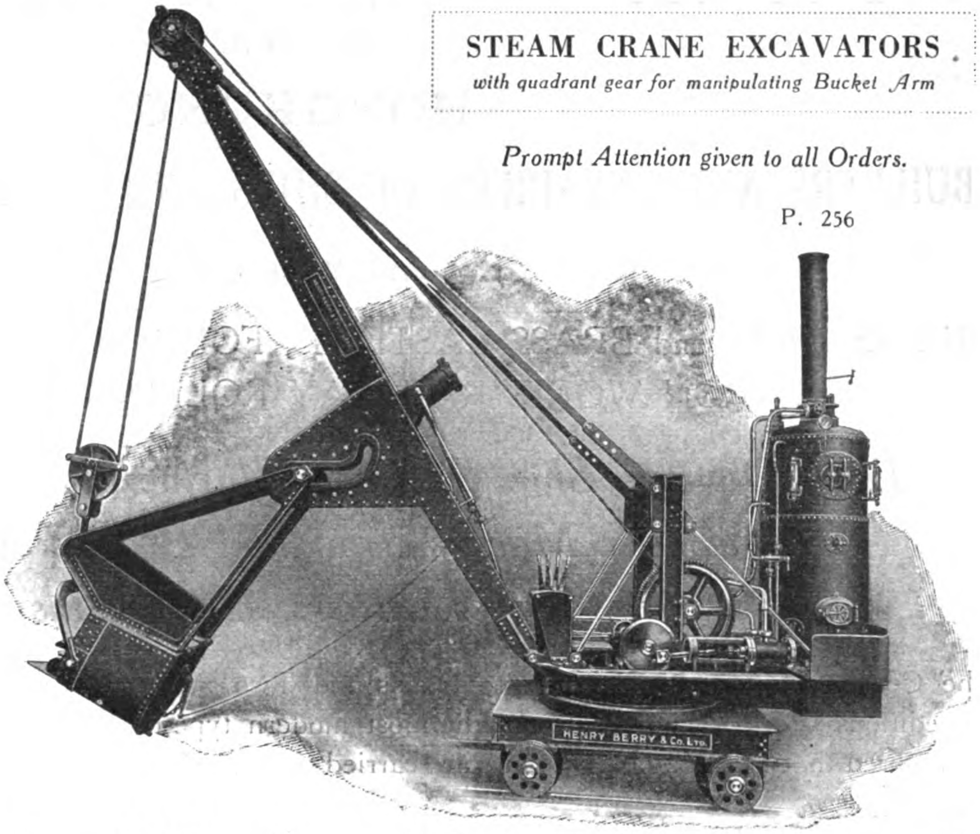
P. 256

Quick Work

This is one of the Berry

8-TON

Steam Driven EXCAVATORS



with a working output per ten hour day of 420 cubic yards in hard clay or 850 in sand. Invaluable for every kind of Mining, Canal and Railway Building Work.

We also supply Shipyards, Boilermakers and Steel Works with Plant of all Kinds.

London Office: 38 Victoria Street, Westminster, S.W. 1.
Indian Agents: Messrs. Burn & Company, Calcutta.

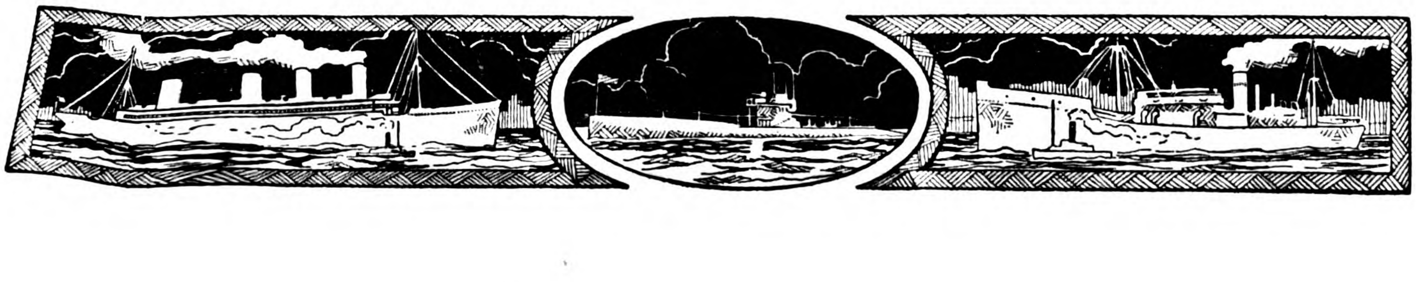
HENRY BERRY & Company Limited.

HYDRAULIC ENGINEERING SPECIALISTS

Codes: A. 1. 5th Edition A.B.C. Engineering

LEEDS, ENGLAND

Codes: Everybody's Pocket Code Marconi International



THE

HONGKONG & WHAMPOA DOCK CO.

LIMITED,

HONGKONG

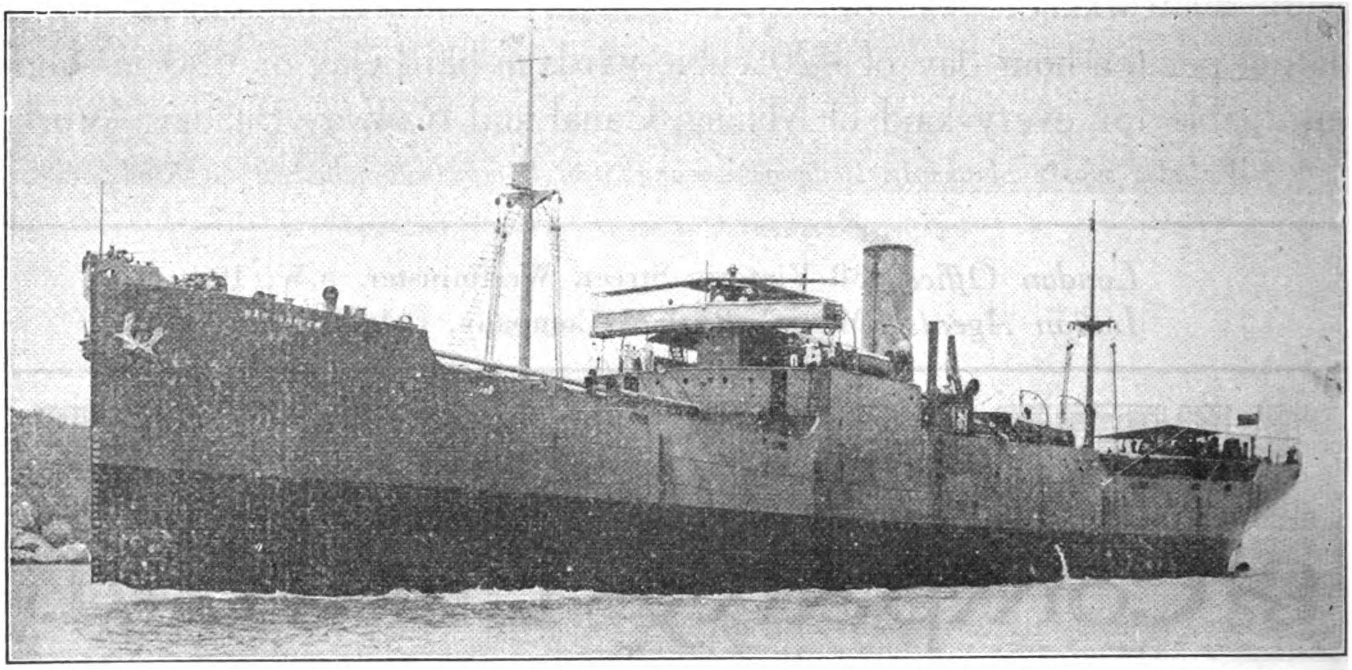
BUILDERS AND REPAIRERS OF SHIPS AND ENGINES OF ALL KINDS

and Makers of

BOILERS, IRON and BRASS CASTINGS, FORGINGS and CONSTRUCTIONAL IRON WORK, RAILWAY ROLLING STOCK, Etc

Dock Owners, Ship Builders, Marine and Land Engineers, Boiler Makers, Iron and Brass Founders, Forge Masters, Electricians

The Company possesses Six Granite Docks and Two Patent Slipways and these are Equipped for Expeditious Work. The Plant is of the most modern type throughout. Ship Owners and Captains are assured that Docking and Repairs are carried out Promptly and at Moderate Charges.



S.S. "*WAR SNIPER*," 8,200 tons d.w.—5,175 tons gross. Built and engined by The Hongkong & Whampoa Dock Co., Ltd. to the order of the British Government.

Address Enquiries to the Chief Manager, R. M. DYER, B.Sc., M.I.N.A., Kowloon Docks, Hongkong

HEAD OFFICE: KOWLOON
TELEPHONE No. 55 K.

TOWN OFFICE: QUEEN'S BUILDINGS
TELEPHONE No. 20 HONGKONG

TELEGRAPHIC ADDRESS: "MANIFESTO" HONGKONG

Codes Used: A1; A.B.C., Fifth Edition; Engineering, First and Second Editions; Western Union and Watkins

MACHINE TOOLS

With Steel Plate or Cast Iron Frames

Agents for China:—

The Anglo-Chinese Engineers' Association, Ltd.

in Association with Reiss & Co.

Address:—

Ice House St., Hongkong

7 Hankow Rd., Shanghai

Liddell Buildings, Yaku Road, Tientsin.

52 Dar Farng Chia Hutung, Peking.

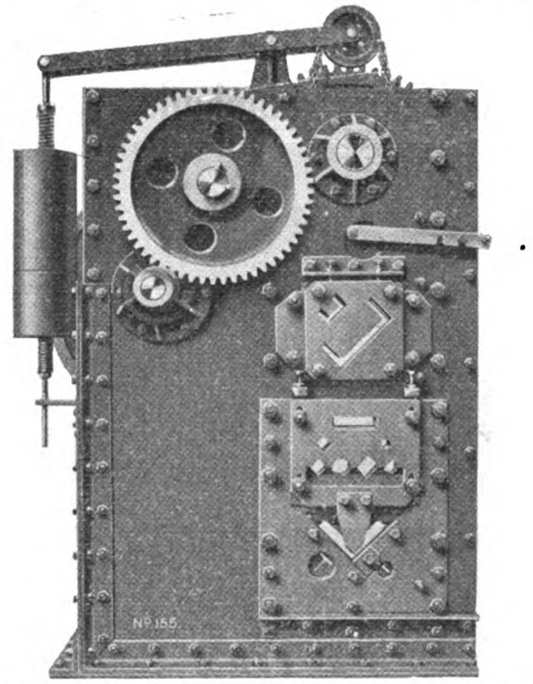


Plate Splitting Machine. For plates of unlimited length and width.

Punching and Shearing Machines.

Plate Bending Machines.

Plate Straightening Machines.

Plate Edge Planing Machines.

Plate Shearing Machines.

Steam Bending and Straightening Machines.

Bar Cropping Machines.

Multiple Punching Machines.

etc. etc.

CRAIG & DONALD LIMITED

Johnstone, Nr. Glasgow, Scotland

BABCOCK & WILCOX, LTD.

PATENT

WATER-TUBE STEAM BOILERS

SUITABLE FOR ALL INDUSTRIES, AND FOR BURNING ANY KIND OF FUEL

13,400,000 H.P. Land-type For Stationary Purposes—**6,400,000 H.P.** Marine-type Afloat

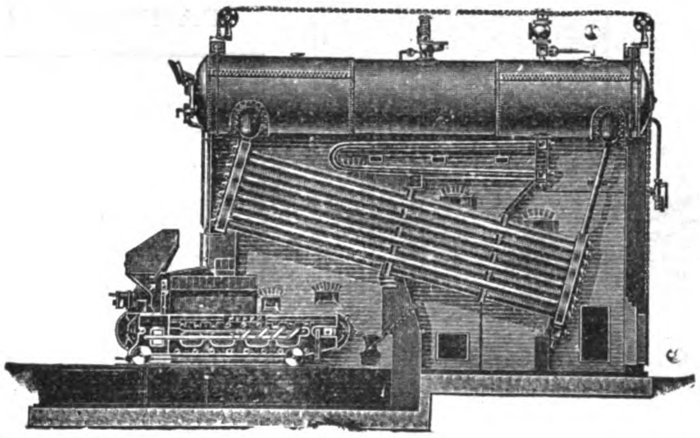
SUPERHEATERS

CHAIN GRATE STOKERS

ECONOMISER

FEED-WATER HEATERS

WATER SOFTENERS AND PURIFIERS



COAL CONVEYORS

SUCTION ASH PLANTS

ELECTRIC CRANES

STEEL CHIMNEYS

STRUCTURAL STEEL WORK

WHITE-FORSTER WATER-TUBE MARINE STEAM BOILERS

BABCOCK & WILCOX LAND BOILER,
fitted with Patent Superheater and Chain Grate Stoker

THE BABCOCK & WILCOX STOKER, of which over 4,300 have been made, is now extensively used throughout the world for burning bituminous and smoky coal without the production of smoke. It is especially suitable in the case of Chinese and other coals, which contain a large percentage of ash, owing to the fact that the stoker is absolutely self-clinkering, and does not require to be touched with firing tools. It is the only mechanical grate which, after extensive trials, has proved to be an unqualified success in burning bituminous coal efficiently and smokelessly.

HEAD OFFICE FOR CHINA: 1 THE BUND, SHANGHAI
" " " JAPAN: I. I-CHOME, YURAKU-CHO, KOJIMACHIKU, TOKYO.

The Shanghai Dock and Engineering Co., Ltd.

Established 1862 **(LATE S. C. FARNHAM, BOYD & CO., LTD.)**

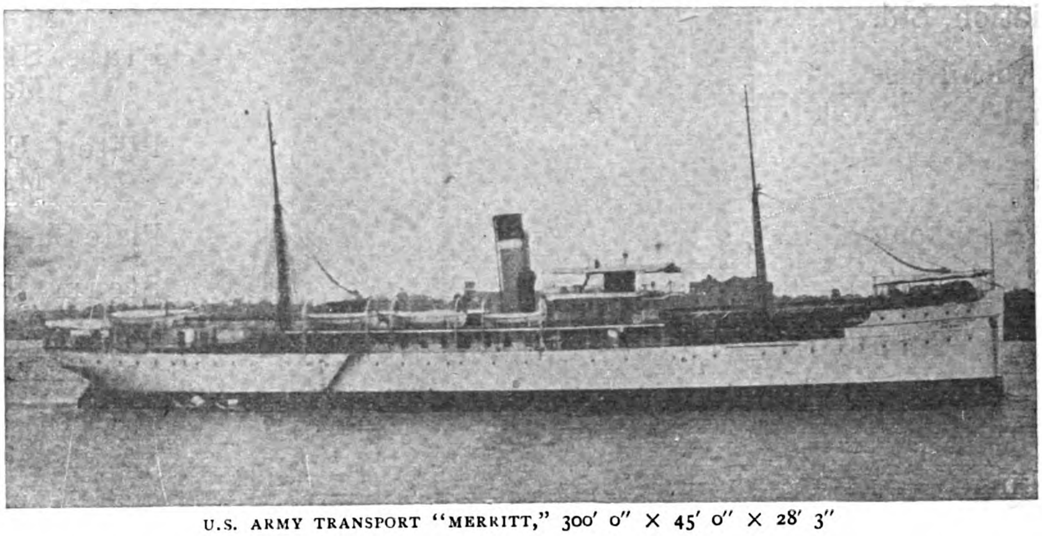
Boilermakers, Dock Proprietors, Shipbuilders, Engineers and Electricians

HEAD OFFICE:

26 Broadway,

Shanghai

Telephone No. 7



U.S. ARMY TRANSPORT "MERRITT," 300′ 0″ × 45′ 0″ × 28′ 3″

Cable Address

"FARNHAM"

Codes Used,

A.B.C. 4th, 5th

& 6th Editions

A-1, Watkin's,

Scott's,

Western Union,

Bentley's

and

Engineering.

The "Merritt" is one of Twenty-Seven Steam Vessels built during the last few years to the order of The American Government for service in the Philippine Islands.

The Docks are five in number, ranging in length from 355 feet to 532 feet on the Blocks, and breadth of entrance from 53 feet to 77 feet, with a depth of water on the sill of from 16 feet to 24 feet.

The Dock charges are the most moderate in the Far East.

The Company's Yards and Docks cover 96 acres. The Water Frontage is about 1½ miles in length. Wharves and Pontoons are arranged where steamers can moor during repairs; and slips for hauling up small vessels are provided. Sheer legs capable of lifting 65 tons are placed at the various Docks.

The extensive Shipbuilding yards and workshops, lit by Electric Light, are provided with the latest improvements, such as travelling cranes of 60 tons' capacity, hydraulic and pneumatic machinery and tools.

Light railway lines are laid throughout workshops and yards.

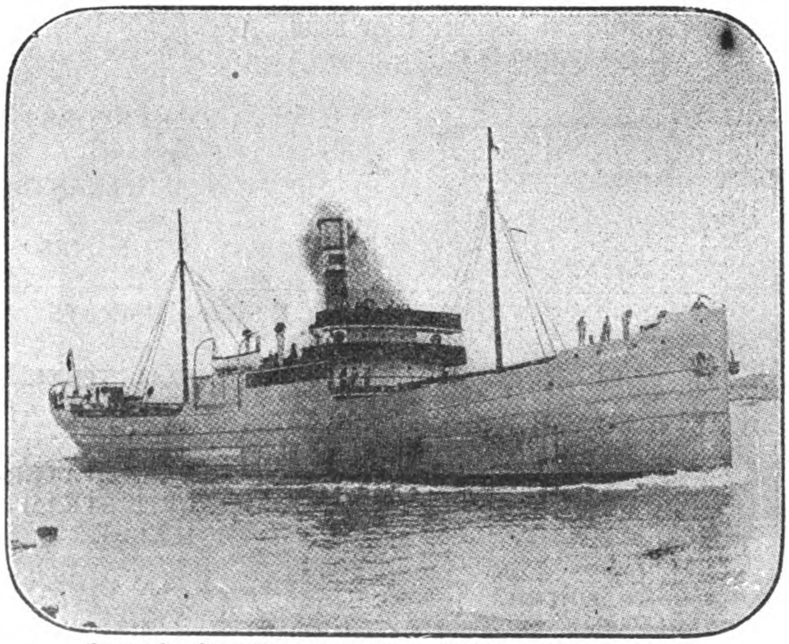
A Staff of Divers, and powerful salvage appliances, and Floating Cranes ready for any emergency at short notice. Enquiries immediately attended to.

Estimates given for all classes of work: Coast Steamers, Side and Stern Wheelers, Tugboats, Launches, Steam Barges, Dredgers, Floating Cranes, and Lighters a speciality.

Every description of repairs and renewal work undertaken and expeditiously executed.

Motor, Land and Marine Engines and Boilers, Centrifugal, Mining, and other pumping machinery always in stock or in progress, also power driven Machine Tools. Engineer's Hand Tools, Steam, Gas, Oil, and Electric machinery and Engineering accessories generally.

Low Pressure Hot Water and Steam Heating Installations



One of Six Steel Cargo Steamers presently under construction.

CALL FLAG FOR VESSELS IN SHANGHAI HARBOUR
"F.B." INTERNATIONAL CODE

PARTICULARS OF DRY DOCKS

Names	Length on Blocks	High Water	
		Breadth of Entrance	Depth of water on Sill
Cosmopolitan Dock ...	532 feet	77 feet	24 feet
International Dock ...	528 ,,	77 ,,	23 ,,
New Dock	450 ,,	74 ,,	21 ,,
Old Dock	399 ,,	53 ,,	16 ,,
Tunkadoo Dock ...	350 ,,	67 ,,	16 ,,

Berths for Building Steamers up to 10,000 tons Deadweight Capacity.

Representatives and workmen attend vessels at Woosung and outports on request.

☞ Telegraphic and Wireless Instructions from vessels promptly attended to

ENQUIRIES SOLICITED

CANADIAN CARBIDE GIVES MORE GAS PER POUND

AND GAS IS WHAT YOU ARE BUYING

Export Drum with Wood over Cask

Years of manufacturing experience, plus facilities for quantity production assure highest gas yield and moderate prices.

CANADA CARBIDE CO., LTD.

Power Building, MONTREAL, CANADA.

Manufacturers and Exporters of

"S" BRAND HIGH-GRADE CARBIDE OF CALCIUM

Cable Address: CARBIDE, Montreal, Canada

Western Union, Bentley's and A.B.C. 5th Edition Codes.

SAIGON RICE

COMPAGNIE

Sino-Francaise de Commerce

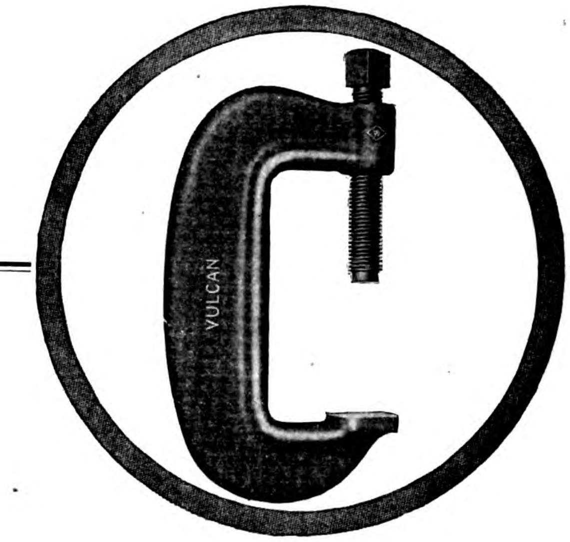
CAPITAL PAID-UP: Frs. 2,000,000

EXPORTERS & IMPORTERS

Shipping and Insurance Agents

Exclusive Agents
For Rice Mills: YEE CHEONG, Cholon
THONG GUAN, Mytho

Saigon 7 and 9 rue Lefebvre
Cable Address: SINOFRANC all Codes



A Sure Foundation

CLAMPS and Lathe Dogs are essential tools in all machine shops. Since they are indispensable to what may be termed basis operations, they form an important part of the foundation on which is built economical production.

Build your foundation strong and sure—use the dependable, sturdy strength of Williams' Superior Drop-Forged Clamps and Lathe Dogs. They'll never fail you and will last a life time. All are acknowledged standard everywhere.

CLAMPS—11 patterns, in a wide range of sizes for every clamping purpose.

SAFETY LATHE DOGS—Bent or Straight Tail, 1 or 2 screws, 16 sizes. Literature on request.

J. H. WILLIAMS & CO.

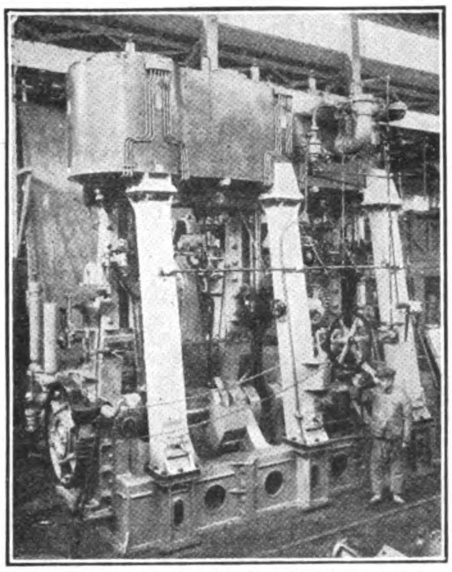
"The Wrench People"

London Representative:
Benjamin Whittaker, Ltd.,
Dept. K.
56 Ludgate Hill, E.C. 4.

Export Office:	General Offices:
124 State Street,	124 Richards Street,
New York, U.S.A.	Brooklyn, N.Y., U.S.A.

THE NEW ENGINEERING & SHIPBUILDING WORKS LTD.

SHANGHAI, CHINA Cable Address: "SPEEDY"



Set of Triple Expansion Engines for Cargo Steamer

ENGINEERS, BOILERMAKERS, ELECTRICIANS, FOUNDERS, WELDERS, SALVAGE EXPERTS

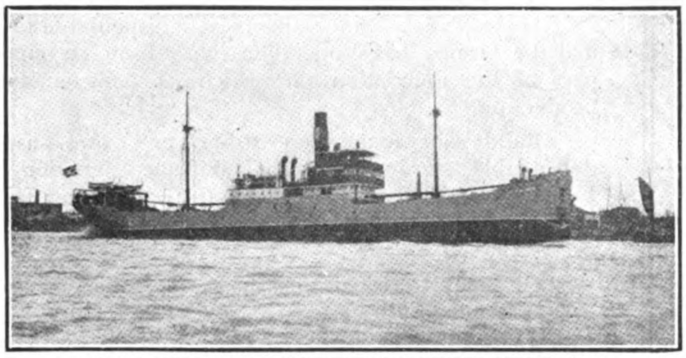
COMPOUND AND TRIPLE EXPANSION ENGINES for marine and stationary purposes.

MARINE MOTOR ENGINES for Petrol, Gasolene, Kerosene or Paraffin.

CONDENSING PLANTS, PUMPS, HOISTING ENGINES, etc.

STEEL STRUCTURAL WORK, BRIDGE GIRDERS AND ROOF TRUSSES

CYLINDRICAL MULTITUBULAR BOILERS, CORNISH and LANCASHIRE BOILERS, VERTICAL BOILERS.



S.S. "Halvdan," one of 8 Steamers Built and Engined at Works

SHIPBUILDERS

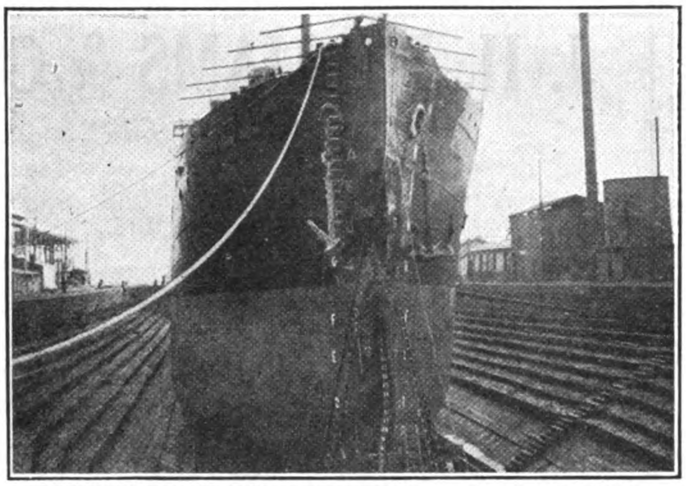
Ocean and River Craft Oil Carriers

Auxiliary Schooners

Shallow Draft Passenger and Cargo Vessels

Steam or Motor Driven

Steel, Wood or Composite built.



7,000-ton Steamer Docked for Repairs of Damage Sustained in Collision

DOCK PROPRIETORS

Yangtszepoo Dock

Length	577'-0"
Entrance	70'-0"
Width of Sill	60'-0"
Depth on Sill	20'-0"

Patent Slips

for vessels up to 200-ft. long

Vessels docked promptly

General Repairs, Annual Overhauls and Re-classification Work executed efficiently and expeditiously under European Supervision.

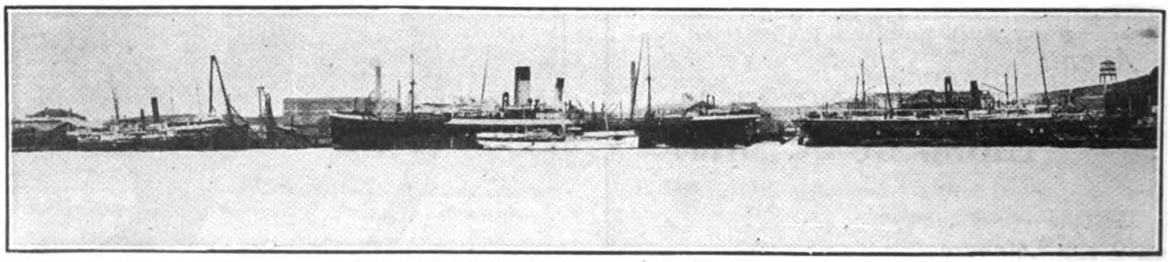
Moderate Charges

Vessels undergoing repairs accommodated at wharves alongside Works.

The Works are equipped with the latest Machine Tools, Electric Drills, Pneumatic and Hydraulic Plant and Tools, Quasi-Arc Electric Welding and Oxy-Acetylene Welding, Galvanizing Plant.

Salvage Experts, Divers and a comprehensive Salvage Plant. Floating Cranes to lift 50 tons and Sheerlegs to lift 80 tons.

THE PROPERTY OF THE COMPANY COVERS AN AREA OF ABOUT 40 ACRES with a RIVER FRONTAGE of 1,800-ft.



General View of Works from River Side

Showing 8 Steamers Berthed Alongside Undergoing Repairs.

Cable Address:
"DOCKYARD" KOBE
"DOCK" DAIREN

A1, A.B.C. (4th and 5th),
Engineering, Scott's, Lieber's
Bentley's
and
Western Union Codes Used

KAWASAKI DOCKYARD CO., LIMITED

CONTRACTORS TO THE IMPERIAL JAPANESE ARMY AND NAVY AND TO FOREIGN GOVERNMENTS

KOBE

ESTABLISHED 1870

STEEL MAKERS, SHIP-OWNERS, LOCOMOTIVE BUILDERS, SHIPBUILDERS, ENGINEERS AND REPAIRERS

BRANCHES:

DAIREN, N.-C.,
Dockyard & Engineering Works

HYOGO, KOBE
Steel Foundry, Bar Mill and Railway Shops

FUKIAI, KOBE
Plate Mill

BUILDERS OF

BATTLESHIPS, CRUISERS, TORPEDO-BOATS, DESTROYERS, SUBMARINES

ALSO, BUILDERS OF

FIRST-CLASS HIGH-SPEED OCEAN STEAMERS OF THE LARGEST SIZE AND POWER

THE URAGA DOCK CO.,

LIMITED

CONTRACTORS TO THE IMPERIAL JAPANESE ARMY, NAVY AND FOREIGN GOVERNMENTS

SHIPBUILDERS, ENGINEERS, BOILERMAKERS AND REPAIRERS

Head Office and Dockyard: URAGA, JAPAN
Branches: TOKYO, YOKOHAMA, YOKOSUKA

Specializing in

CARGO BOATS
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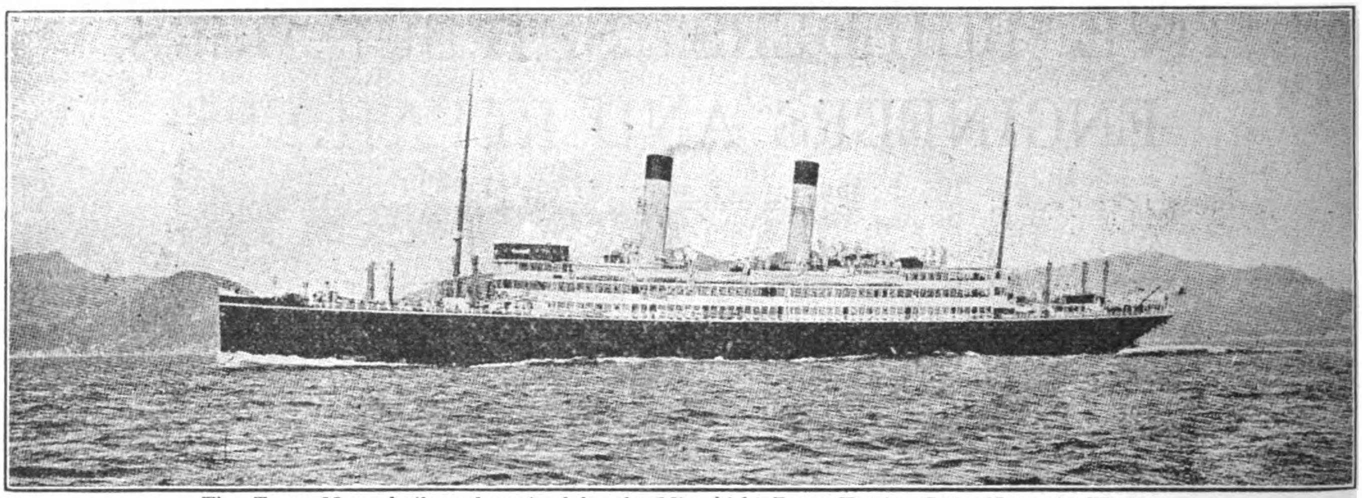

The *Tenyo Maru*, built and engined by the Mitsubishi Zosen Kaisha, Ltd., Nagasaki Works

MITSUBISHI ZOSEN KAISHA, LTD., NAGASAKI WORKS

(ex Mitsubishi Dockyard & Engine Works, Nagasaki)

	DOCK No. 1		DOCK No. 2		DOCK No. 3	
Extreme Length	523	Ft.	371	Ft.	728.9	Ft.
Length on Blocks	513	,,	350	,,	714	,,
Width of Entrance on Top	89	,,	66	,,	99½	,,
,, ,, ,, ,, Bottom	77	,,	53	,,	88½	,,
Water on Blocks at Spring Tide	26½	,,	24	,,	34½	,,

THE BEST EQUIPPED SHIPBUILDING PLANT IN THE FAR EAST

With Special Facilities for Handling the Heaviest Castings and the Repairing or Building of Ships, Engines, and Boilers
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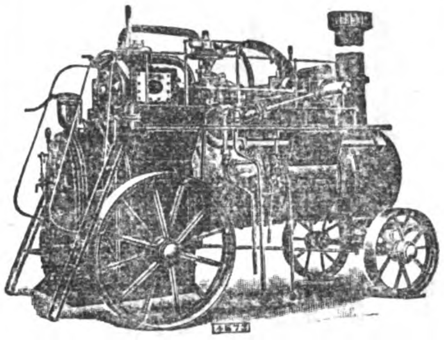
LARGE STOCK OF MATERIAL AND FITTINGS ALWAYS ON HAND



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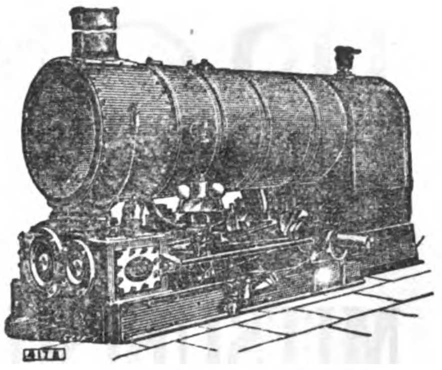

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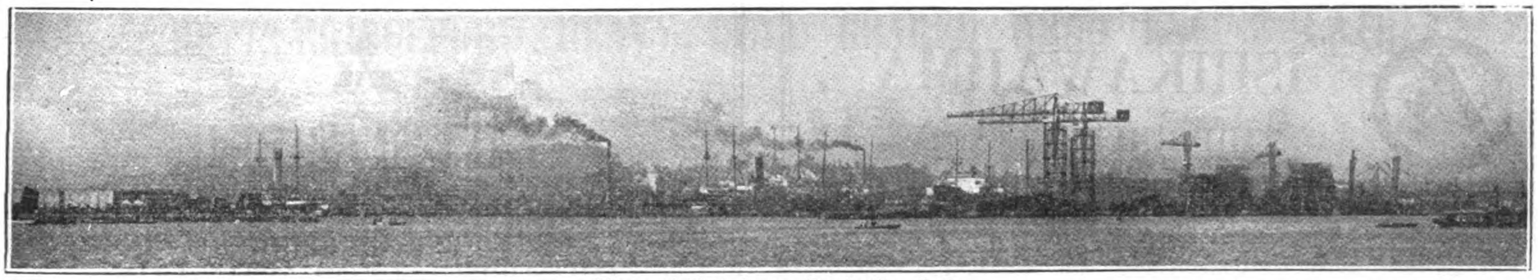
PEKING



View of Yokohama Dock Co., Ltd.

THE YOKOHAMA DOCK COMPANY, LTD.

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Operating Dockyard, Shipbuildingyard and Storage Warehouses at Yokohama, Japan.

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Builders for
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Japanese Navy,
Nippon Yusen Kaisha,
and other Principal Shipowners

Cable Address:
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Code Used:
A. 1. A.B.C. 4th and 5th, Bentley's

DRY DOCKS:

No. 1	625′ × 80′ × 28′
No. 2	380′ × 50′ × 26′
No. 3	480′ × 63′ × 21½′

SHIPBUILDING BERTHS:

No. 1	400′ × 27′
No. 2	490′ × 30′
No. 3	580′ × 36′
No. 4, No. 5	680′ × 38′

WAREHOUSES:	TSUBO.
Iron Building	8,871.57
Concrete Building	1,636.99
Brick Building	2,011.72
Others	5,807.74

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Managing Director: TOKURO UCHIDA

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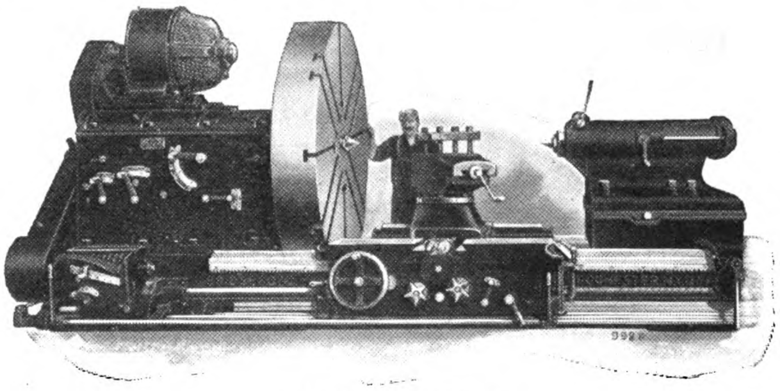

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A Betts Machine Tool for every need in heavy duty work. Let us have your problems.

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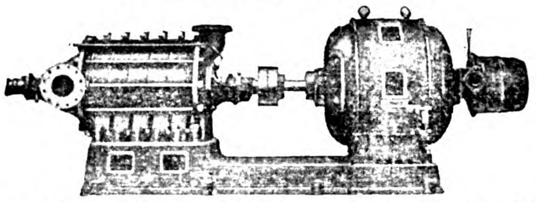
For Mine Sinking, and Pumping



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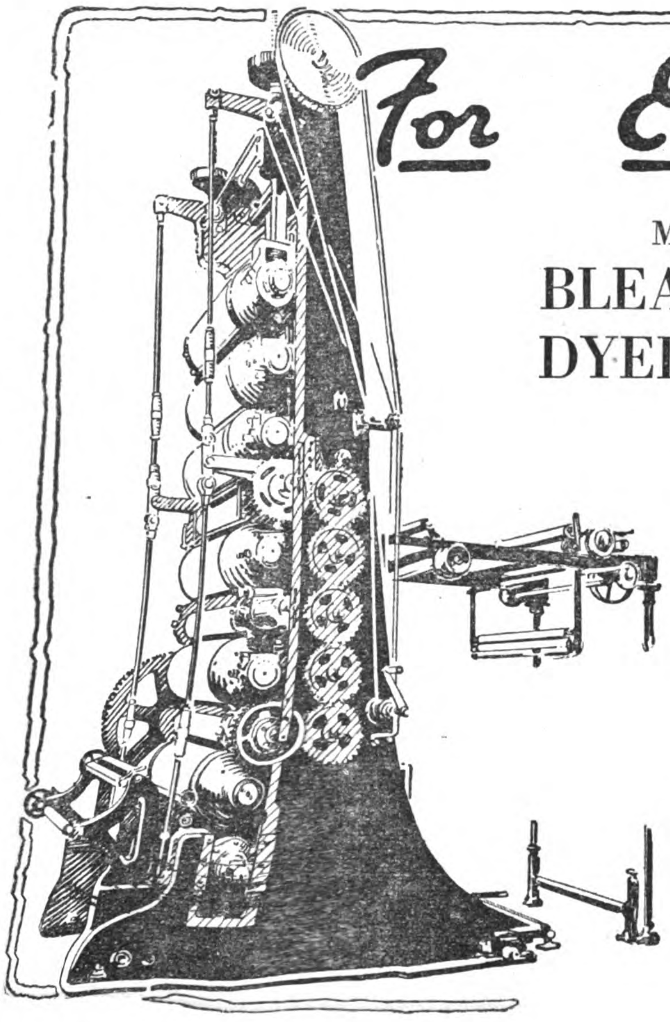

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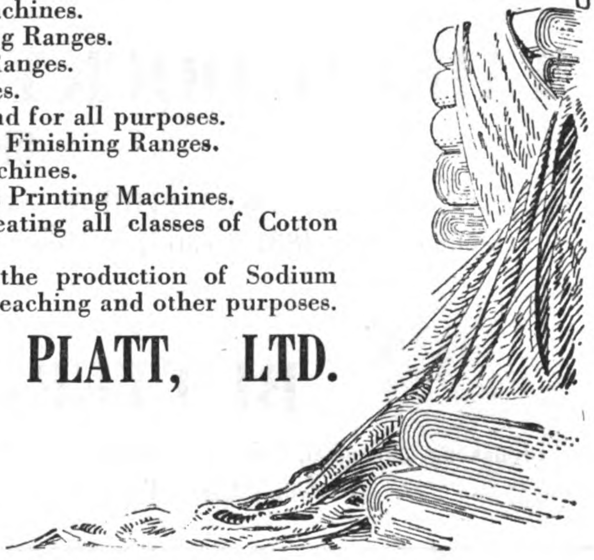

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22,000 Tons, Triple Screw Turbine—21 Knots

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S.S. "KOREA MARU" sails for Orient, Dec. 5, 1921
S.S. "SIBERIA MARU" " " " Dec. 23, 1921
S.S. "TENYO MARU" sails for Orient, Jan. 3, 1922
S.S. "SHINYO MARU" " " " Jan. 24, 1922

Sailings from Shanghai

S.S. "KOREA MARU" sails for San F'cisco, Nov. 2, 1921
S.S. "SIBERIA MARU" " " " " Nov. 18, 1921
S.S. "TENYO MARU" sails for San F'cisco, Dec. 1, 1921
S.S. "SHINYO MARU" " " " " Dec. 22, 1921

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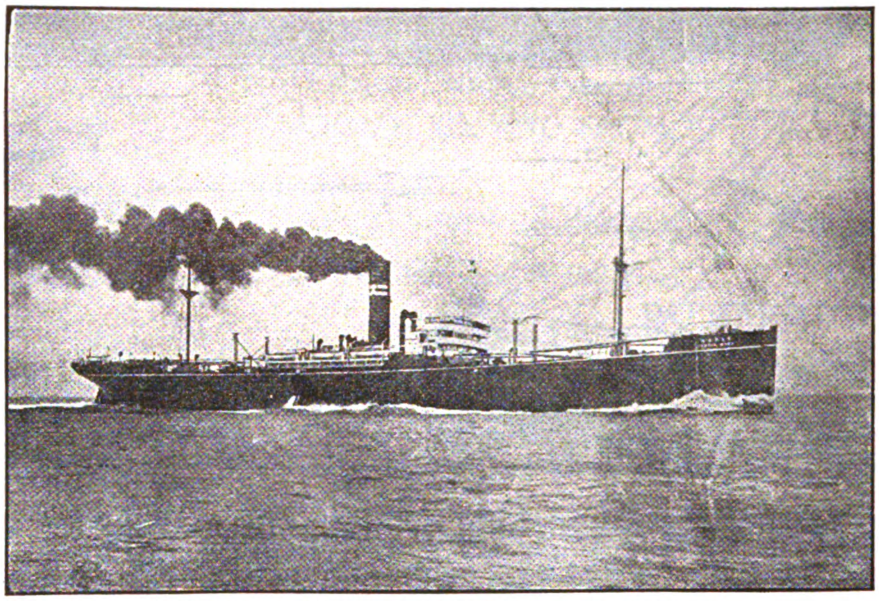
Reserves: Y. 66,000,000

40 Regular Lines with a Fleet of 500,000 Tons Gross.



PRINCIPAL REGULAR LINES:

JAPAN-EUROPE LINE (via Suez)—Monthly—Ports of Call: Yokohama, Kobe, Moji, Shanghai, Hongkong, Singapore, Colombo, Port Said, Marseilles, London, Antwerp, Rotterdam and Hamburg.

JAVA-EUROPE LINE:—Monthly—Ports of Call: Sourabaya, Padan, Colombo, Port Sudan, Suez, Genoa, Marseilles, Antwerp and Hamburg.

CALCUTTA-NEW ORLEANS LINE: 7 sailings per annum—Ports of Call: Calcutta, Singapore, Hongkong, Nagasaki, Kobe, Yokohama, San Francisco, Balboa, Cristbal, Cienfuegos and New Orleans.

SINGAPORE-NEW YORK LINE:—Monthly—Ports of Call: Singapore, Hongkong, Shanghai, Moji, Kobe, Yokohama, San Francisco, Balboa, Cristbal, Havana and New York.

JAPAN-BOMBAY LINE:—Fortnightly—Ports of Call: Yokohama, Yokkaichi, Osaka, Kobe, Moji, Hongkong, Singapore, Colombo and Bombay.

HONGKONG-PUGET SOUND LINE:—Fortnightly—Ports of Call: Hongkong, Manila, Keelung, Shanghai, Nagasaki, Kobe, Yokkaichi, Shimizu, Yokohama, Victoria, Seattle, Tacoma and Vancouver.

JAPAN-SOUTH AMERICA LINE:—Monthly—Ports of Call: Yokohama, Kobe, Nagasaki, Hongkong, Singapore, Colombo, Mauritius, Durban, Cape Town, Rio de Janeiro, Santos and Buenos Ayres.

JAPAN-AUSTRALIA LINE:—Monthly—Ports of Call: Yokohama, Kobe, Osaka, Moji, Hongkong, Manila, Sydney, Melbourne and Adelaide.

JAPAN-JAVA LINE:—Monthly—Ports of Call: Osaka, Kobe, Moji, Keelung, Manila, Sandakan, Tawao, Batavia, Sourabaya and Macassar.

SERVICES TO CHINA.—

OSAKA—Dairen Line.—Semi-Weekly.
OSAKA—Tientsin Line.—6 Sailings per month.
OSAKA—Tsingtau Line.—2 Sailings per month.
YOKOHAMA—Dairen-Tientsin Line.—About 8 Sailings per month.
TAKAO—Tientsin Line.—2 Sailings per month.
Keelung-Hongkong Line.—Weekly.

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KOKUSAI KISEN KAISHA

Nominal Capital	- -	Yen 100,000,000.00
Paid-up Capital	- -	„ 87,500,000.00
Aggregate Tonnage	- -	500,000 Tons

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Name	Tons D.W.
Rozan-Maru	8,700
Vancouver-Maru	9,100
Boston-Maru	8,800
Tofuku-Maru	9,100
Chifuku-Maru	9,100
Ryufuku-Maru	9,100
Hankow-Maru	6,400
Yoni-Maru	11,000
Taibu-Maru	8,900
San Francisco-Maru	9,100
Naple-Maru	9,100
Glasgow-Maru	9,100
Yayoi-Maru	8,700
Yaye-Maru	11,000
Malta-Maru	8,700
Buyo-Maru	8,800
Brazil-Maru	9,100
Kofuku-Maru	9,100
Yezari-Maru	6,900
Yugao-Maru	5,000
Yubaye-Maru	5,000
Sydney-Maru	6,400
Shanghai-Maru	6,400
Singapore-Maru	9,100
Jyufuku-Maru	9,100
Hiyeizan-Maru	6,700

Name	Tons D.W.
Seifuku-Maru	9,100
Suez-Maru	6,600
Daio-Maru	9,000
Kashu-Maru	8,800
No. 2 Kifunesan-Maru	5,000
Yousan-Maru	5,000
Taisan-Maru	5,000
Yuri-Maru	11,000
Texas-Maru	11,000
Tamatsu-Maru	6,600
Eifuku-Maru	9,100
Kifuku-Maru	9,100
Toyofuku-Maru	9,000
Raifuku-Maru	9,100
Keifuku-Maru	9,100
Washington-Maru	9,100
Tokufuku-Maru	9,100
Portland-Maru	9,100
England-Maru	9,100
Chili-Maru	9,100
Argentine-Maru	9,100
Port Said-Maru	9,100
New York-Maru	9,100
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BRANCH OFFICE:

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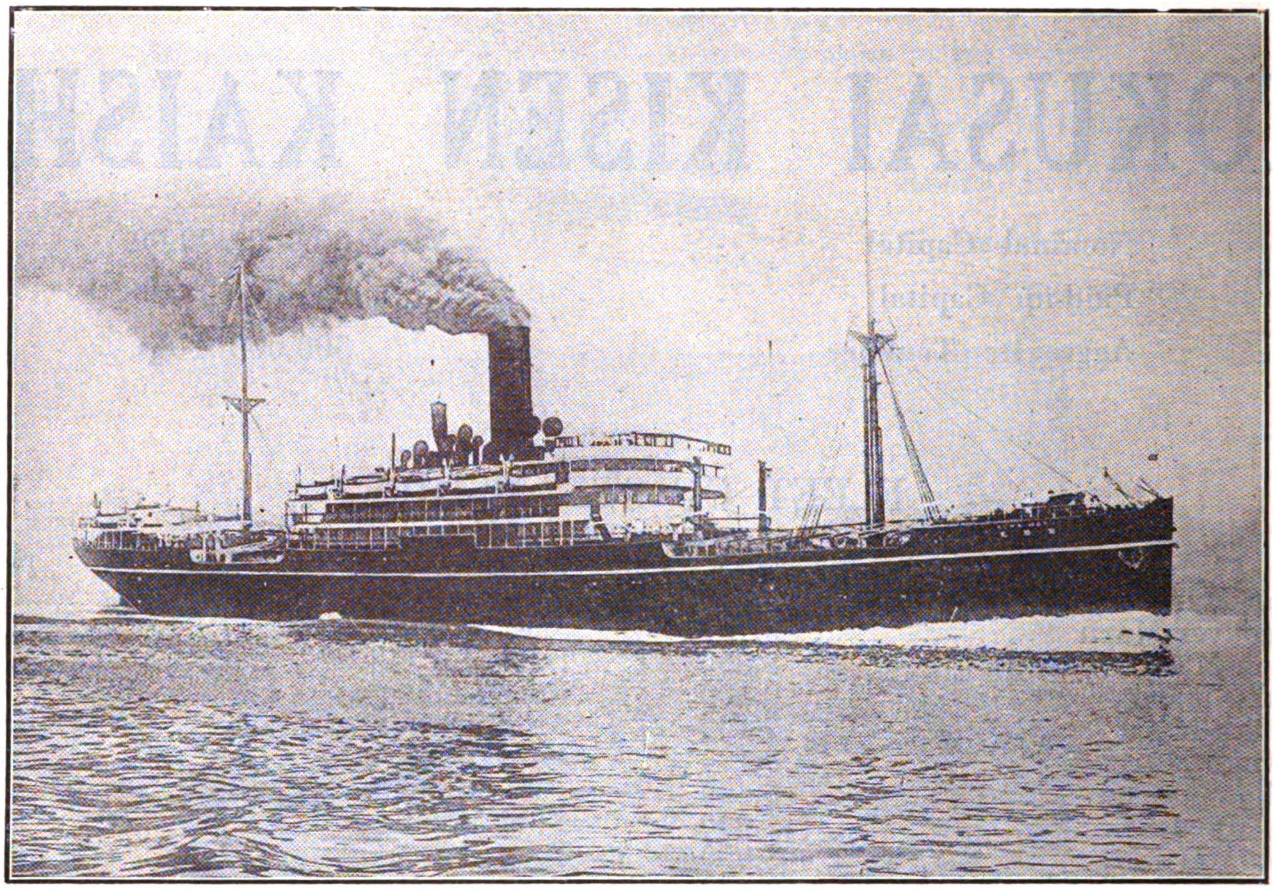

PRINCIPAL LINES:

EUROPEAN LINE—Fortnightly

LIVERPOOL LINE—Every 4 weeks

HAMBURG LINE—Every 4 weeks

SEATTLE LINE—Twice a month

NEW YORK LINE (via Panama)—Every 4 weeks

SOUTH AMERICAN LINE—Once every 2 months

AUSTRALIAN LINE—Monthly

CALCUTTA LINE—Fortnightly

CALCUTTA-NEW YORK LINE—Monthly

BOMBAY LINE—Fortnightly

JAPAN-JAVA-CALCUTTA LINE—Monthly

SHANGHAI LINE—3 times a week

NORTH CHINA LINE—9 times a month

SOUTH SEA ISLANDS LINE—Semi-monthly

In addition to the above, numerous lines are also operated to principal Ports throughout the world.

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Fleet 100 Vessels **Gross Tonnage 500,000**

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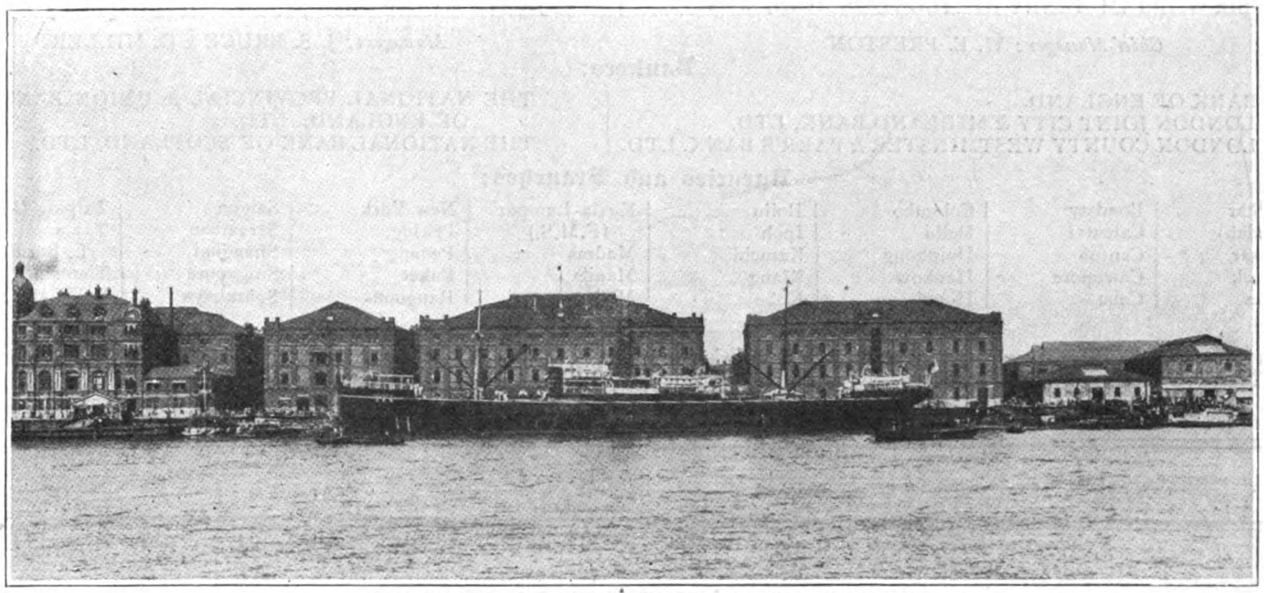

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Penang	Colombo	Calcutta	Liverpool
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Reserve Fund £3,600,000
Reserve Liabilities of Shareholders . £3,000,000

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TAKASHI HARA

The Commoner of Japan, the Leader of the Liberals, Advocate of Peace and Co-operation, has been stricken down by the dagger of the assassin, at a time when the nation is passing through the greatest crisis in its long history. Quick to sense the change that came over the world with the defeat of Germany, the masterful leader of the Seiyukai had the power to impose the will of his party upon the militarists and shape the policy of Japan along lines harmonizing with the trend of the times. Supported by the full weight of the great commercial and financial interests of the empire, Premier Hara in guiding the Ship of State through the diplomatic ordeals of post bellum days, has given evidence of an intense desire to work in cordial accord with America by entering the Consortium on an equal basis with the other Powers. At all times he demonstrated a sincere willingness to bridge the gap across the Pacific and clasp the hand of America in hearty friendship and cooperate with her for the solution of Pacific problems. Under his able and far-seeing leadership, the Japanese Delegation has proceeded to Washington prepared to make further and more important concessions in order to demonstrate anew Japan's true spirit of friendship for the United States and China.

His death comes at a moment fraught with grave danger to the establishment of permanent principles for the guidance of future Pacific diplomacy. Although there are many in Japan who believe that he was the one statesman who wielded the power to dominate the situation and pull the empire through the present crisis, the forward movement of the past three years has carried Japan so far along the path of true popular government that his death will hasten rather than retard its ultimate success. Japan will swing into line with the other great liberal nations of the world. Concede unto Japan the same rights of self-preservation enjoyed by all other nations, and her people can be depended upon to relegate the militarists into a subordinate position and assume gladly their share of the burdens for advancing world peace and good understanding. If the Pacific Conference hews to these lines, Premier Hara will not have died in vain. His work will live. When the princes, field-marshals and other leaders of present-day Japan are forgotten, the name of TAKASHI HARA will go thundering down the pages of history as one of the world's great figures, the martyr whose death brought understanding and peace to the nations of the Pacific.

The Far Eastern Review

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The Philippine Sugar Industry

By GEORGE H. FAIRCHILD, Manila

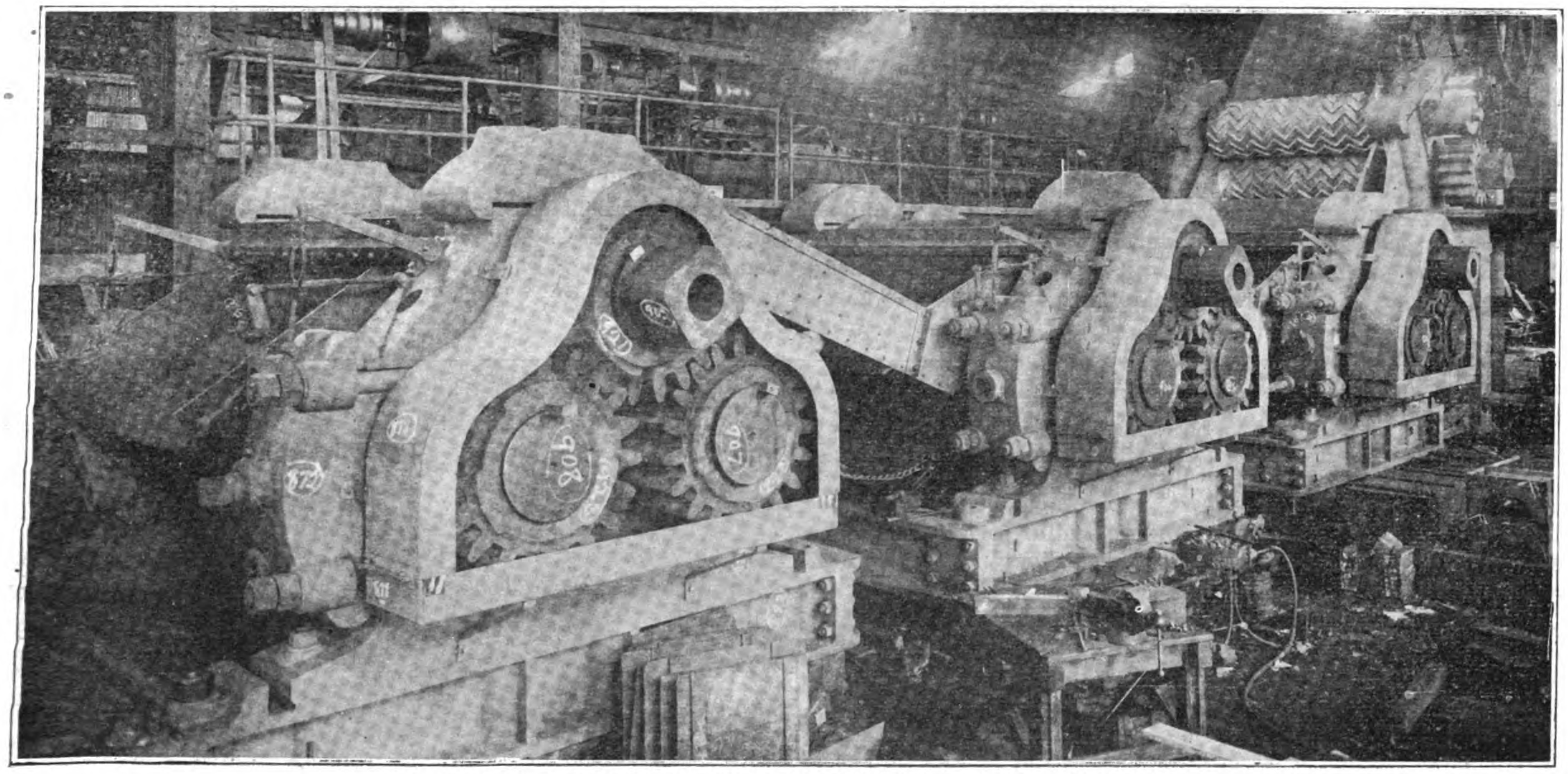
According to authoritative records, sugar was exported from the Philippines to the United States as early as 1795, United States statistics for that year showing that some 132 long tons of Philippine sugar were imported.

Some of the cultivated varieties of sugar cane in the Philippine Islands are presumed to have been introduced from China, and it is possible that others are indigenous to the islands. The methods adopted in the native mills for the manufacture of muscovado sugar also came from China.

Up to the middle of the nineteenth century, the production of sugar cane was confined largely to the provinces in Luzon nearby Manila, but following an increased demand from Europe for sugar during the Crimean War interest in the industry was greatly stimulated and the development of the industry extended into the Visayas, and Negros Occidental became the largest cane-producing sector in the Philippines. From that time on up to about the end of the Spanish administration, the industry shows a steady development, the banner year being 1893, when approximately 300,000 tons of sugar were exported.

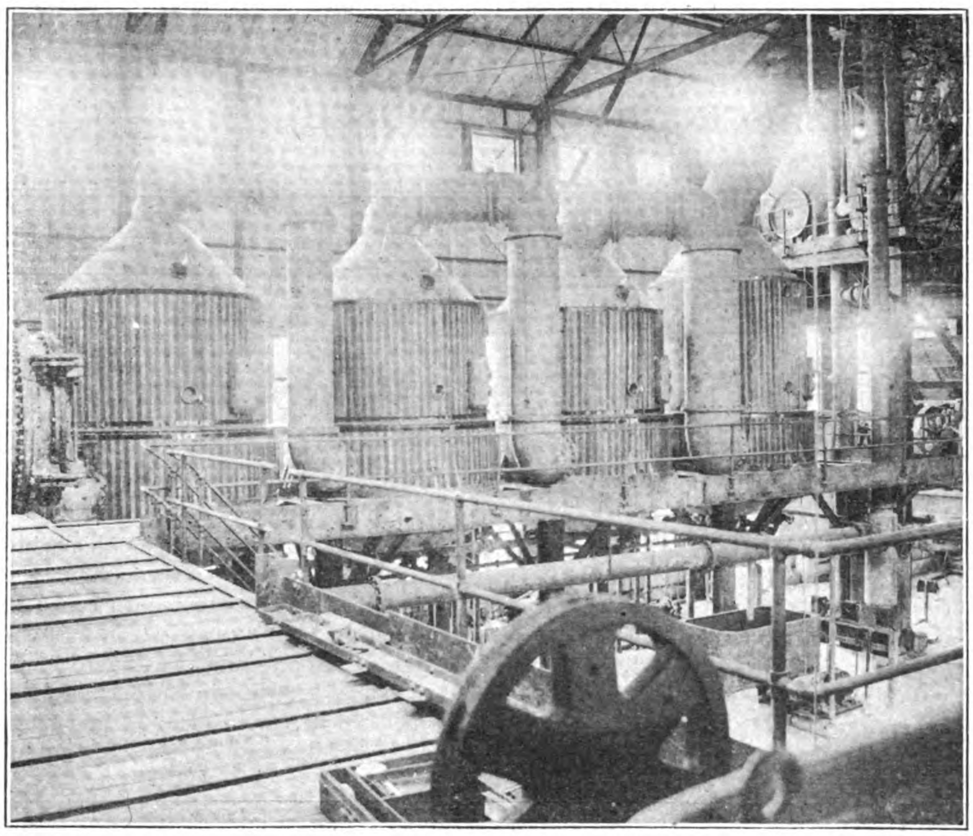
All this sugar was what is known as muscovado sugar, this being the quality of cane sugar in general production throughout the world at that time. Towards the end of the nineteenth century, however, refiners began to insist upon a higher quality of raw sugar from cane than muscovados. This was occasioned by the development to a high degree of the beet sugar industry in Europe, and the fact that beet sugar could be turned out in refined form. Other cane-producing countries met the refiners' demand by the erection of more up-to-date mills, but the Philippine Islands, for reasons which will be given, continued until within the past ten years to use their native mills. But the advantages of modern sugar centrals have now been brought home to the planters. There are at present twenty in operation and eight under construction or planned for immediate development, and it will not be long before the ratio of centrifugals to muscovados is reversed.

The political situation of the country towards the end of the nineteenth century undoubtedly retarded the development of the sugar industry. During that period, there was much political unrest, which culminated in the insurrection against Spanish sovereignty; later on the American occupation of the islands,



THE FIRST MODERN SUGAR MILL ERECTED IN THE PHILIPPINES

A nine roller mill and crusher, consisting of three 36" by 84", 3 roller mills and one 30" by 84" Krajewski crusher, made by the Honolulu Iron Works for the Mindoro Sugar Company



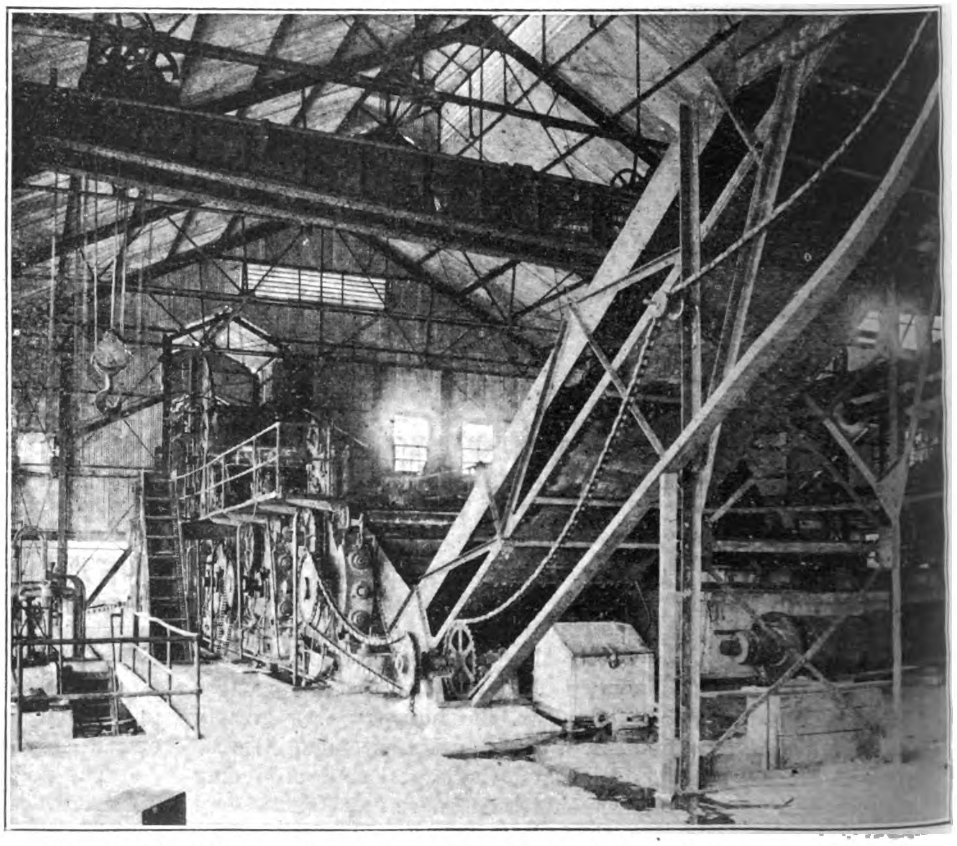
Quadruple Effect of the San Carlos Central Factory, Philippine Islands, erected by the Honolulu Iron Works

followed by a period of disturbances until law and order were finally established. And as if political troubles were not enough, there came an epidemic of rinderpest, which is said to have destroyed 80 per cent. of the work animals in the islands. In view of the political uncertainties of the time, it is not surprising that there was no influx of much-needed capital to modernize and develop the sugar industry in keeping with the development that took place in other cane-producing countries; and following such a calamity as the rinderpest epidemic, one is not surprised to find production considerably reduced. During the first ten years of American occupation, as a result of these unfavorable conditions, the exports of sugar from the Philippines averaged only about one-half what they were during the last ten years of Spanish occupation. However, the passage of the Payne-Aldrich Bill in 1909 providing for free entry into United States markets of up to 300,000 tons of Philippine sugars* and, a little later, the introduction of modern sugar centrals into the industry, stimulated production, which increased considerably, so much so that the year 1916 showed exports of sugar amounting to about 375,000 tons of 2,000-lbs., the largest in the history of the sugar industry of the Philippines. This favorable showing was mostly due to an exceptionally favorable growing and harvesting season. Since that time production has decreased about 40 per cent. due partly to unfavorable weather conditions, but to a greater extent to adverse shipping conditions arising out of the scarcity of tonnage occasioned by the war and the high freight rates for such tonnage as was available. The lack of tonnage and high freight rates prevented sugar from reaching the United States and European markets, and stocks accumulated to such an extent that the situation became critical, until, through influence exerted in Washington, arrangements were made to ship a large quantity of the accumulated stocks to United States.

But with the termination of the European war, the sugar industry in the Philippines passed rapidly from its critical stage into one of unprecedented prosperity. The effects of the war upon the beet sugar industry in Europe have been drastic; production decreased from 8,000,000 tons in 1913/14 to 3,600,000 in 1918/19. While Cuba and some other cane-producing countries materially increased their production during the war-period, the total world production of sugar decreased from 18,700,000 tons in 1913/14 to 16,300,000 tons in 1918/19.

Upon the cessation of hostilities, the world found itself facing a serious shortage of sugar. Large purchases of Javan sugar by European countries in the beginning of 1919 left China and Japan looking around for sugar to meet their requirements, and naturally their attentions turned to the Philippines. Then began the era of high prices, unprecedented in the history of the sugar industry in the Philippines. Prices rose steadily from P. 7 per picul for No. 1 sugars in the beginning of the year to P. 30 per picul by the middle of the year, and centrifugals advanced in the same period from P. 11 per picul to P. 34.

The future of the sugar industry in the Philippines holds out much promise. Throughout the world there is an increased demand for sugar. It is estimated that the world could now well take care of at least 20,000,000 tons of sugar. Not only therefore



Nine Roller Mill and Crusher on the San Carlos Central Factory, erected by the Honolulu Iron Works

*This limit was removed under the Jones Bill, so that now there is no limit to the quantity of Philippine sugars that may be admitted into United States duty free.

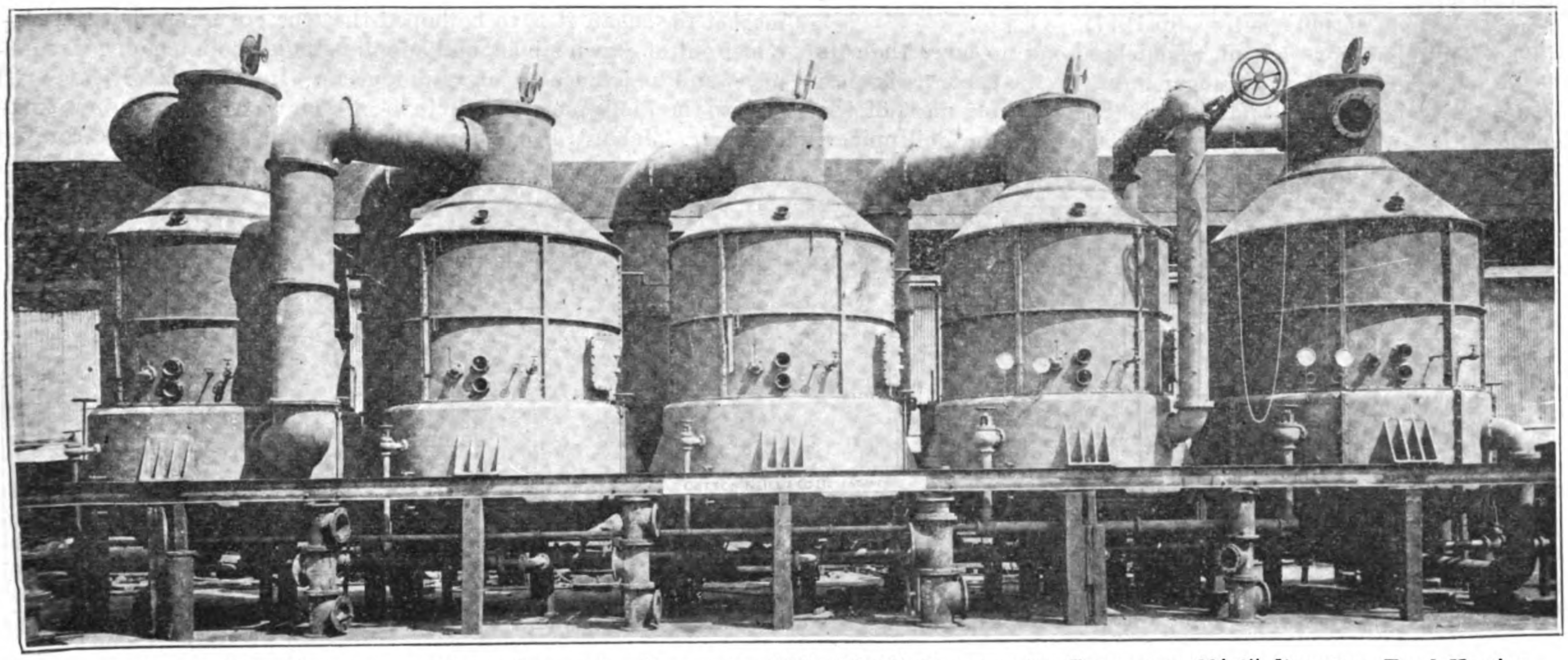
A 34" by 78" Fifteen Roller Mill Built by Catton, Neill & Co., Ltd., for the Maao Sugar Central, P.I.

has the world to make good a deficit of 2,000,000 tons on pre-war production, but it has also to provide an additional 2,000,000 tons to supply its needs, and there is no satisfactory substitute in sight. In other words, it has to increase its production by 4,000,000 tons.

Here is an opportunity for Philippine cane producers to exert themselves, and I shall touch briefly on what, in my opinion, are the best means to increase production in these islands.

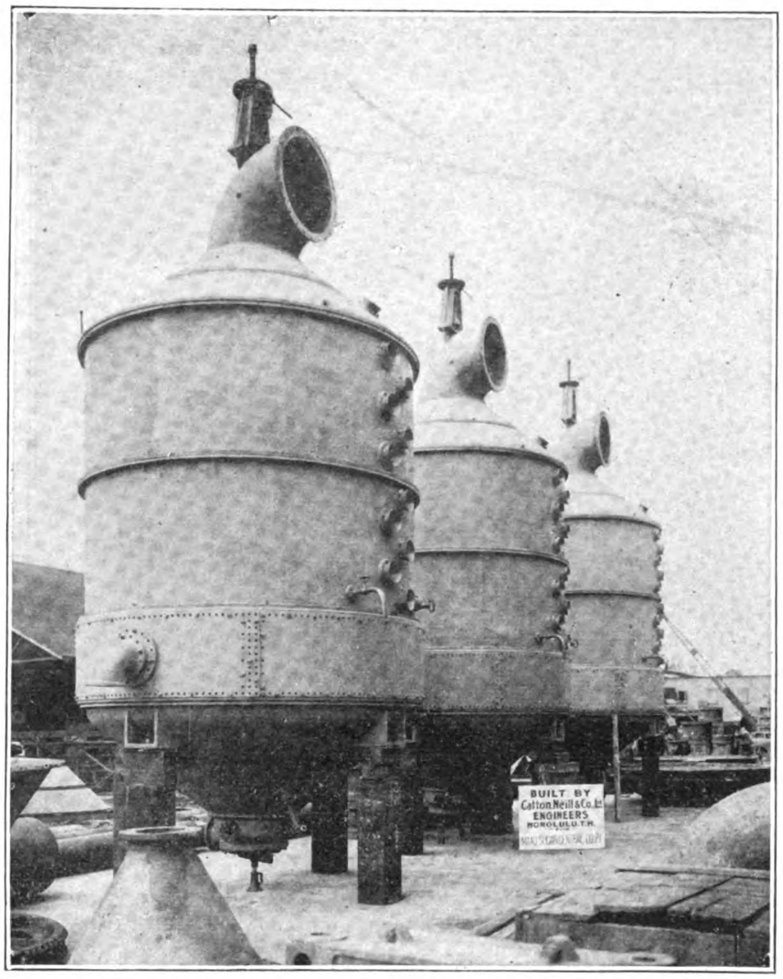
II

Possibly the Philippines could find its best lesson in increasing its sugar production from Japan's policy in rehabilitating and developing the sugar industry in Formosa. When Japan acquired Formosa in 1894/5 as a result of the Chino-Japanese war, the opportunity was made available to her to solve an economic problem which had been causing her considerable anxiety, viz., to provide some means within her own territory of meeting the



A Quadruple Effect Evaporator with Pre-Evaporator; Evaporator Cells 11'-00" diameter; Pre-Evaporator, 12' 6" diameter; Total Heating Surface 26,000 Square Feet. Built by Catton, Neill & Co., Ltd., of Honolulu, for the Maao Sugar Central, P.I.

continually increasing demand for sugar. The consumption of sugar in Japan at that time amounted to 300,000 tons, of which Japan produced only 65,000 tons, leaving 235,000 tons to be imported. Japan lost no time in taking advantage of this opportunity, and the fact that production in Formosa has been increased so tremendously is generally admitted to be due to the encouragement received from



Vacuum Pans, Built by Catton, Neill & Co., Ltd. for the Maao Central, P.I.

the government. When Japan took over Formosa, the production had fallen to 30,000 tons, but by a systematic study of conditions carried on under the direction of the government, production has gone up to as high as 440,000 tons (in 1917).

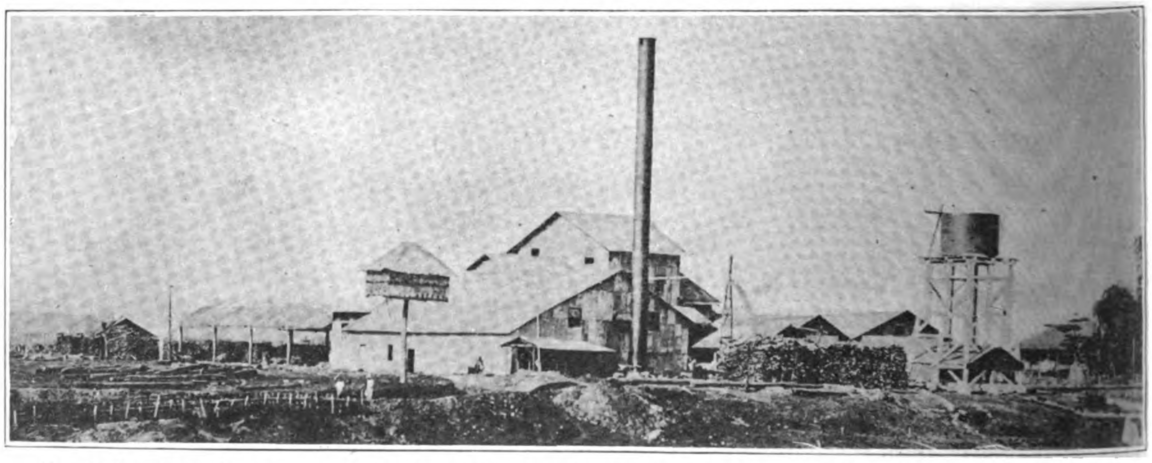
The Philippine government would be doing no more than its duty by rendering to the local sugar industry the same assistance that Japan rendered to the industry in Formosa, for most of the problems that required solving in Formosa exist in the Philippines. The Japanese government sent experts to make a close study of the industry ,o determine the best means to adopt for the improvement of the methods used both in the cultivation and in the manufacture of the product. The first result of this investigation was the importation of some of the Hawaiian varieties of cane, and it is stated that the prosperity of the Formosan sugar industry dates from this. In 1901 the Japanese government sent Dr. Nitobe, chief of the industries bureau, to Formosa, requesting him to make a thorough investigation of the sugar possibilities of the entire island of Formosa. In his report, Dr. Nitobe outlined a comprehensive plan to be carried out during a ten-year period. The following recommendations made by him are so applicable to the sugar industry in the Philippines that they compel publication :

(1) Improvement of cane by importation of better varieties from other sugar-producing countries ;
(2) Introduction of a more intensive method of cultivation ;
(3) Establishment of a model farm to demonstrate to the farmers the advantages of improved methods ;
(4) Increase the yield by use of artificial irrigation ;
(5) Improvement of manufacturing methods by the introduction of modern sugar machinery;
(6) Make provision to train experts in all branches of the industry.

The Japanese government proceeded to develop the industry along the lines recommended by Dr. Nitobe, and the results exceeded expectations. During the ten-year peiiod prescribed by him, the acreage under cane had increased from 65,000 to 225,000 acres, and the total quantity of sugar produced from 50,000 to over 300,000 tons. The government also granted bounties to planters for the specific purpose of meeting expenses involved in purchasing fertilizers, and modern machinery, and in reclaiming and draining land and making improvements. The adoption of improved methods of cultivation has increased the yield of cane per acre from ten tons to 15 tons and in many instances to 20 tons; or, in other words, the yield of sugar per acre has increased from 1 ton to 1½ with good prospects that it will soon reach 2 tons according to statistics contained in the government records. It is interesting to note in passing that the bulk of the Formosan cane crops are produced by Chinese. From a table which appears later on showing the yield of sugar per acre in the Philippines, it will be noted that during the past nine years, it has only averaged three-quarters of a ton per acre, less than half the yield obtained in Formosa, and comparing even more unfavorably with the large cane-producing countries of the world.

When we view the tremendous development the co-operation of the Japanese government with private enterprise has made in the Formosan sugar industry during the past twenty years, and reflect that at the end of the same period production in the Philippines is practically the same as it was at the beginning, it would seem that the Philippine government can no longer afford to close its eyes to the necessity of providing the means to stimulate and increase sugar production in the Philippines.

In view of the importance of the sugar industry in the economic welfare of the country, and the excellent prospects in the world's market for sugar, it is to be hoped that the government will take a leaf out of Japan's book and adopt a similar policy of encouragement and assistance to sugar producers. In time the Orient will look to the Philippines to help to meet their increasing requirements of sugar. Japan's need of rice has resulted in the restriction of



San Isidro Central: Original Capacity 150 tons now crushing 250 tons per day with the same crushing plant. An illustration of the smallest type of Honolulu Iron Works Factory

area planted to cane in Formosa, and the Formosan sugar crop is not therefore likely to exceed in future 300,000 tons. The consumption of sugar in Japan has now reached 500,000 tons, and it is evident therefore that Japan will be a large importer of raw sugar in future. It is also possible that the same need of rice will prevent Java from being able to materially increase her sugar production. The Philippines have sufficient land available to produce more rice then they need and to double within a short time their present production of sugar without materially increasing the areas now under cultivation to cane.

It is interesting to note that Cuba, which already employs 40,000 Chinese laborers, in order to safeguard its present sugar production and if possible to increase it, is going to increase this number to 100,000 within the next two years. In Hawaii, 50,000 field laborers are required to produce the annual crop of from 500,000 to 600,000 tons of sugar, but soil and climatic conditions in Cuba are such that the same amount of labor in Cuba could possibly produce three times more sugar than it could in Hawaii. 100,000 Chinese in Cuba should therefore be able to produce from 2,000,000 to 3,000,000 tons of sugar annually. The introduction of 50,000 Chinese into the sugar industry in the Philippines would, through the application of more intensive methods of agriculture, which are not possible under existing conditions, double the present sugar production from the area at present under cultivation for cane.

III

The following statistics on Philippine sugars from authoritative sources may prove of interest to those who have been sufficiently interested in the future of Philippine sugar to have read to this point.

Exports of Sugar from the Philippines, 1891-1918

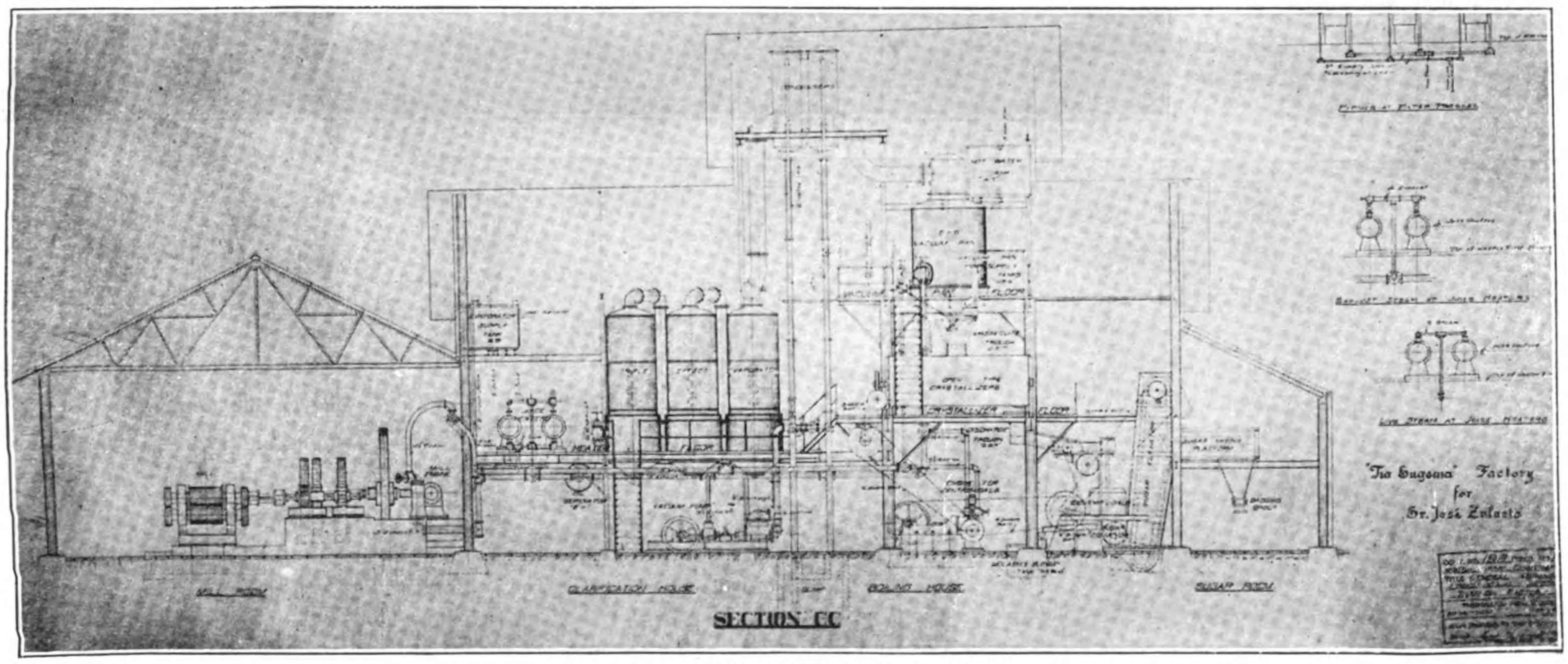
Year	Total Tons of 2,000-lbs.	Exports according to Report of the Insular Collector of Customs for Year 1918 Tons of 2,000-lbs.
Spanish Administration		
1891	187,058,130	
1892	276,868,410	
1893	293,088,740	
1894	217,714,140	
1895	258,813,240	
1896	256,971,680	
1897	226,240,700	
American Occupation		
1898	200,176,270	
1899	104,219,780	94,986,990
1900	69,777,890	72,148,090
1901	62,047,160	62,941,970
1902	103,121,200	109,118,660
1903	100,306,710	94,411,940
1904	91,455,420	96,343,310
1905	117,592,440	120,077,650
1906	139,309,800	143,268,930
1907	136,661,210	141,568,420
1908	153,235,250	160,181,000
1909	138,024,250	143,129,700
1910	130,762,800	134,434,930
1911	232,085,770	231,350,700
1912	215,681,550	218,107,820
1913	171,534,650	174,124,230
1914	260,503,110	261,736,930
1915	232,644,440	233,531,970
1916	374,141,810	373,506,700
1917	229,313,980	227,882,900
1918	285,506,060	302,420,370

The exports during the last seven years of the Spanish administration as shown in the foregoing statement averaged 245,000 tons yearly, and during the past seven years 250,000 tons, showing that in so far as exports are concerned, the local sugar industry occupies to-day practically the same position as it did twenty years ago.

Sugar Production in the Philippine Islands

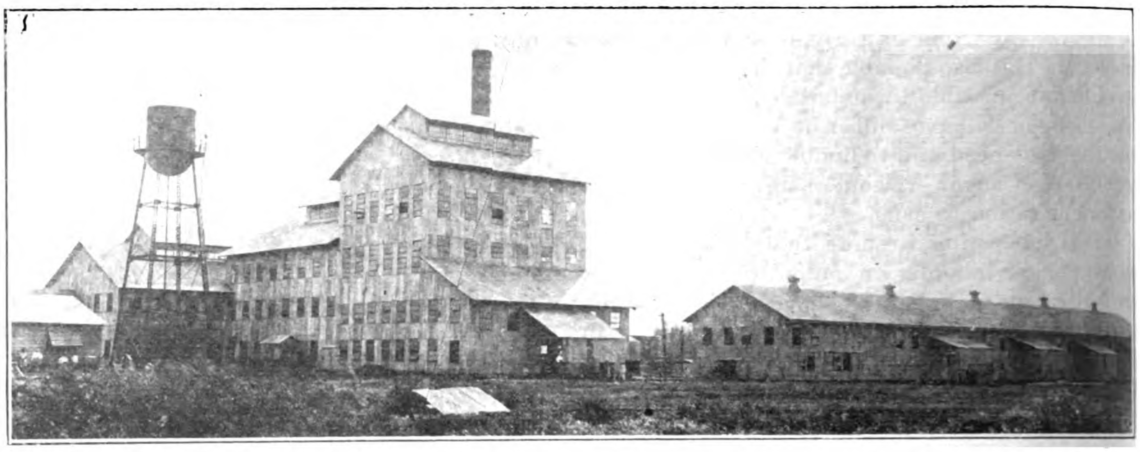
(Bureau of Agriculture Statistics)

Year	Production Tons of 2,240-lbs.	Area Acres	Tons of sugar per acre
1910	149,913	207,920	0.72
1911	239,568	300,783	0.796
1912	250,685	410,652	0.61
1913	307,461	440,295	0.698
1914	363,494	423,590	0.858
1915	375,280	432,730	0.867
1916	367,334	449,402	0.819
1917	378,910	464,827	0.815
1918	422,995	513,777	0.82
Total	2,855,640	3,643,976	
Average	317,293	404,886	0.78

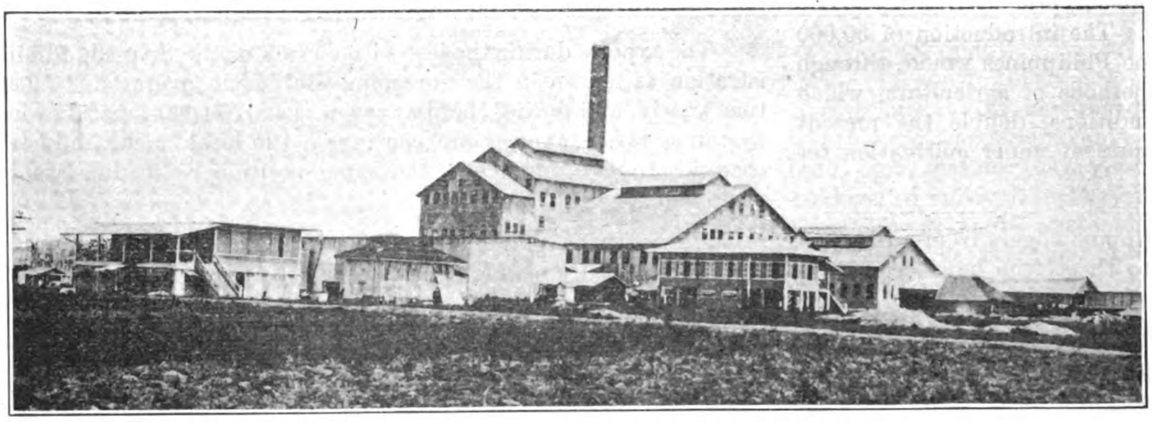


PLAN OF THE SAN ISIDRO CENTRAL

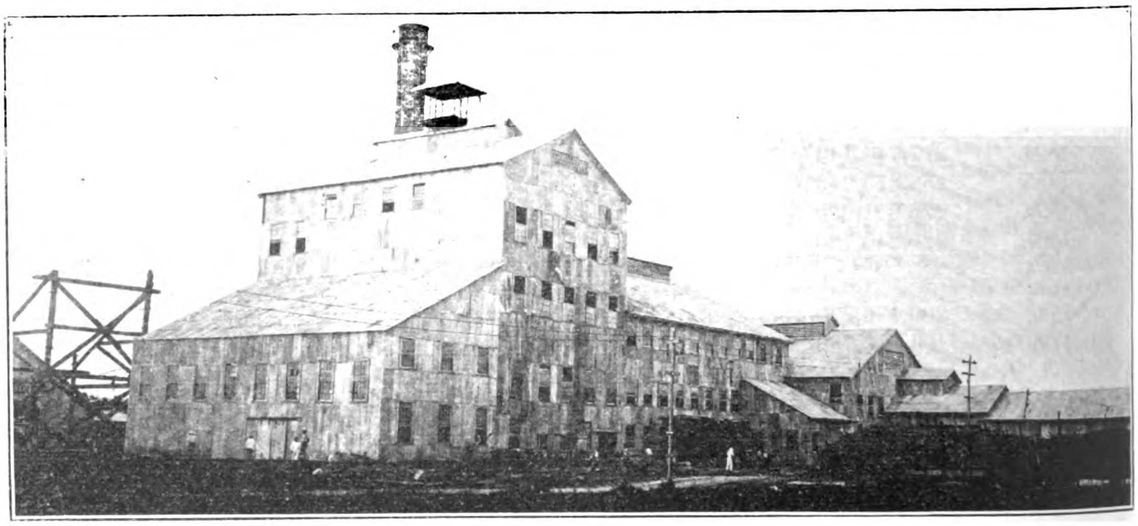
TYPICAL HONOLULU IRON WORKS CENTRALS IN THE P.I.



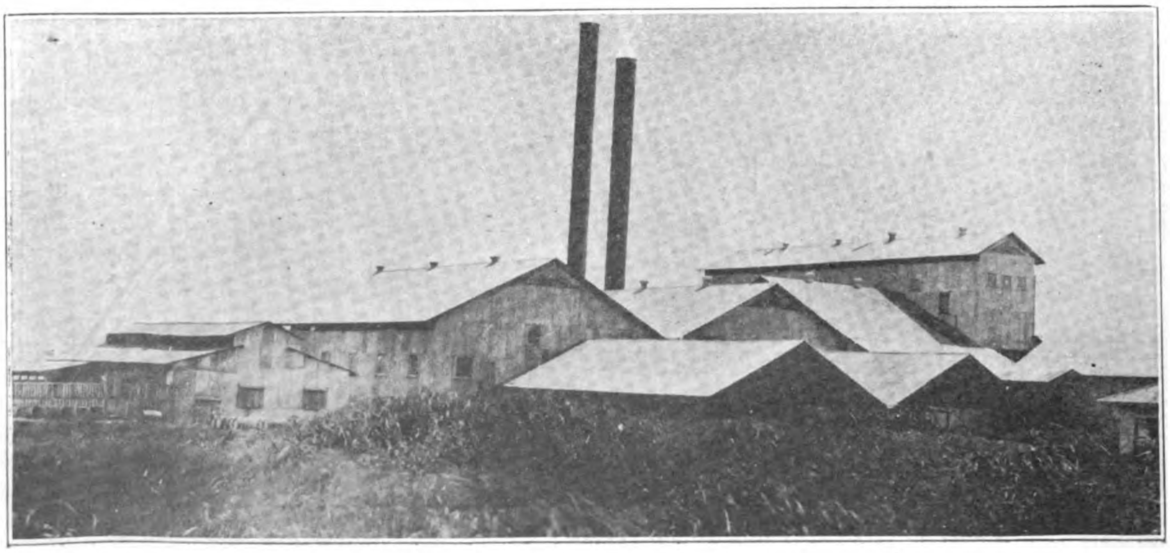
Mill of the Bacolod Murcia Milling Company at Bacolod, Negros Occidental. Capacity, 600-800 tons; Crushing Plant, Nine Roller Mill 30″ by 60″ with two Roll Crusher 30″ by 60″, manufactured 6,000 tons of Sugar the first Season



Mill of the Hawaiian Philippine Company located at Silay Negros Occidental. Capacity, 1,500 tons; Crushing Plant, H. I. W. 12 roller mill 34″ by 78″ with 3 Roller Crusher 34″ by 74″ Built and operated for the first season by the Honolulu Iron Works

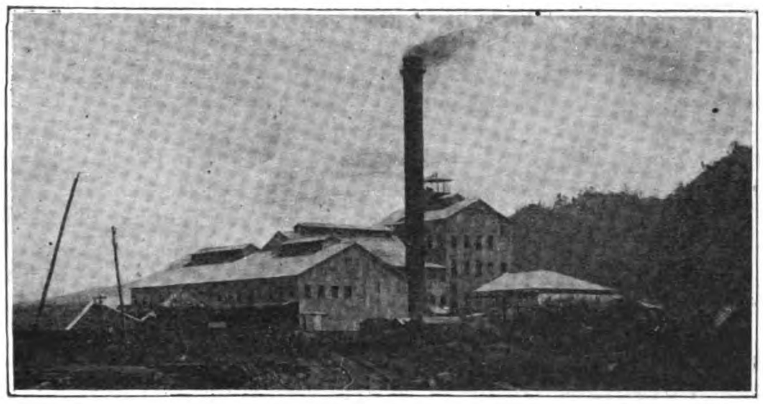


Mill of the Talisay Silay Milling Company located at Talisay, Negros Occidental. Capacity 1,000 tons; Crushing Plant, 9 roller H. I. W. mill 34″ by 78″ and two Roll Crusher 34″ by 78″. Three exact duplicates of this factory have been built in the Philippines at La Carlota, Bais and Talisay. La Carlota Central manufactured last season 19,000 tons of sugar



Mill of the North Negros Sugar Company, located at Manapla, Occidental Negros. Original capacity, 300 tons, extended to 800 tons in 1919 and to 1,000 tons in 1921. Equipped with 2 sets of H. I. W. nine Roller Mills and two Roller Crushers, 26″ by 54″.

The difference between the quantity of sugar produced and the quantity exported should give some idea of the quantity of sugar consumed in the Philippines, but a comparison between these figures does not provide any satisfactory conclusion. In some years the figures for production practically agree with those for



Central de Bais, Capacity 1,000 tons

exports, which would mean a ridiculously low figure for the local consumption of sugar; in other years, there is such a disparity between the figures as to make the consumption appear excessive. The quantity of sugar consumed locally has been generally estimated at from 50,000 to 100,000 tons per annum, but I am of the opinion that the latter figure is too high. The per capita consumption of sugar in Japan is $16\frac{1}{2}$-lbs. per annum, and I believe that the per capita consumption in Japan is greater than in the Philippines. Possibly not more than 75,000 tons of sugar are consumed annually in the Philippines. With a population of 10,000,000 people, a consumption of 1,500,000-lbs. allows a per capita consumption of 15-lbs. per annum

I have referred to the extremely low yield of sugar per acre, which is shown in the above table as being only slightly over three-quarters of a ton. The following statistics from authoritative sources, showing the yields obtained in most of the cane-producing countries, will prove interesting and show the need of the government providing a dependable supply of labor from external or internal sources to permit of intensive methods of cultivation in the Philippines similar to those employed in Formosa and in Java and thereby make it possible for the Filipino cane planter to approximate the yields now being obtained in Formosa where the soil and climatic conditions are inferior to those which are found in the Philippines:

Hawaii	... 5 tons of sugar per acre
Java ...	... 5 tons of sugar per acre
Cuba ...	... 2 tons of sugar per acre
Porto Rico	... 2 tons of sugar per acre
Formosa	... $1\frac{1}{2}$ tons of sugar per acre
Trinidad	... 1 to $1\frac{3}{4}$ tons of sugar per acre
Jamaica...	... $1\frac{1}{2}$ tons of sugar per acre
Antigua	... $2\frac{1}{4}$ tons of sugar per acre
Queensland	... $1\frac{1}{3}$ to $1\frac{3}{4}$ tons of sugar per acre
Fiji ...	... $2\frac{1}{2}$ tons of sugar per acre
Mauritius	... 2 tons of sugar per acre
Natal ...	... $2\frac{1}{3}$ to 3 tons of sugar per acre
Egypt ...	... $1\frac{3}{4}$ tons of sugar per acre
*Philippines	... $\frac{3}{4}$ tons of sugar per acre

*In places where modern methods are in use the yields equal those obtained in Formosa.

Table No. 4

List of Sugar Centrals in the Philippine Islands

SHOWING NAME, LOCATION, YEAR WHEN BUILT, AND CAPACITY IN TONS OF CANE PER DAY.

Calamba Sugar Estate, Canlubang, Laguna (1913), 1,800 tons.
Pampanga Sugar Central, Floridablanca, Pampanga (1919), 1,500 tons.
San Carlos Milling Company, San Carlos, Negros Occidental (1914), 1,200 tons.
Mindore Sugar Company, San Jose, Mindoro (1910), 1,000 tons.
Isabela Sugar Central, Isabela, Negros Occidental (1919), 600 tons.
North Negros Sugar Company, Manapla, Negros Occidental (1918), 600 tons.
Bearing Central, Cabancalan, Negros Occidental (1914), 500 tons.
Philippine Sugar Development Co., Calamba, Laguna (1914), 300 tons.
De La Rama Sugar Central, Bago, Negros Occidental (1913), 300 tons.
Guance Central, Hinigaran, Negros Occidental (1913), 300 tons.
San Isidro Central, Cabancalan, Negros Occidental (1917), 250 tons.
Carmen Central, Calatagan, Batangas (1914), 200 tons.
Palma Central, Ilog, Negros Occidental (1916), 200 tons.
San Antonio Central, La Carlota, Negros Occidental (1913), 150 tons.
Dinalupihan Factory, Dinalupihan, Bataan (1913), 125 tons.
Talisay Central, Talisay, Negros Occidental (1913), 125 tons.
Canlaon Factory, Canlaon, Negros Occidental (1913), 125 tons.
Muntinlupa Factory, Muntinlupa, Rizal (1912), 100 tons.
Saint Louis Oriental Factory, Manaog, Pangasinan (1912), 90 tons.
Lock Factory, Masugbu, Batangas.

Centrals Under Construction

SHOWING NAME, LOCATION, YEAR OF MILLING CROP, AND ARRANGEMENTS MADE FOR INCREASING THE CAPACITY TO 2,000 TONS.

Hawaiian-Philippine Co., Silay, Negros Occidental (1920/21), 1,500 tons.
Ma-ao Sugar Central, Ma-ao, Negros Occidental (1919/20), 1,500 tons.
La Carlota Sugar Central, La Carlota, Negros Occidental (1919/20), 1,000 tons.
Bais Sugar Central, Bais, Negros Occidental (1919/20), 1,000 tons.

Projects Definitely Planned for Development

Talisay-Silay Sugar Central, Talisay, Negros Occidental, 1,000 tons.
Bacelod-Murcia Sugar Central, Bacelod, Negros Occidental, 1,000 tons.
Pampanga Development Co., San Fernando, Pampanga, 1,200 tons.

Small Factories Using Open Train Evaporators and Vacuum Pans

SHOWING NAME, LOCATION, YEAR WHEN BUILT, AND CAPACITY IN TONS OF CANE PER DAY.

Pampanga Sugar Factory, Floridablanca, Pampanga (1619,) 100 tons.
Bernia Factory, Dinalupihan, Bataan (1918), 90 tons.
Kennedy Factory, Isabela, Negros Occidental (1918), 90 tons.
De la Vina Factory, Vallchermosa, Negros Occidental (1918), 90 tons.
Tubigan Sugar Factory, Tubigan, Bohol (1917), 90 tons.

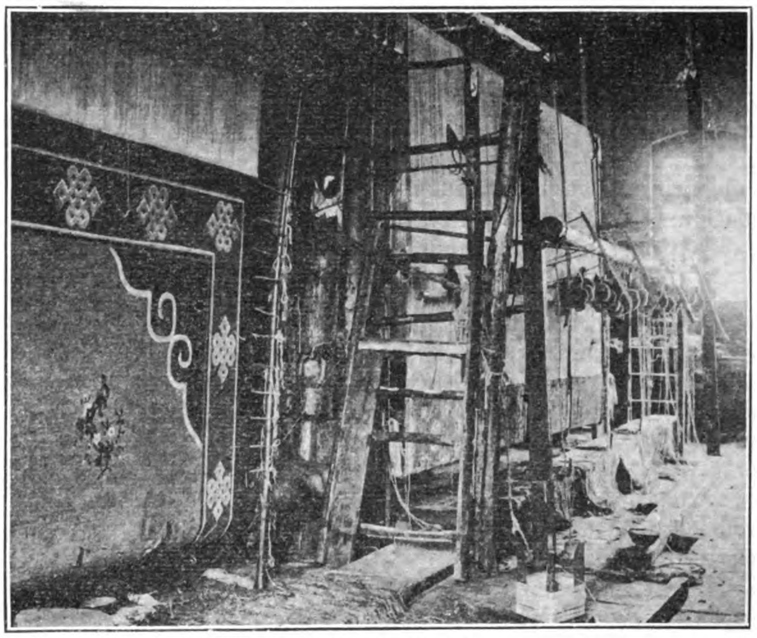
These centrals could easily take off 250,000 tons of 96° sugar during a season, and most of them are so built that their capacity can be increased at small cost to take care of at least another 100,000 tons.

The Rug Industry of North China

By JAY C. HUSTON

IN describing Chinese rugs, the term "Tientsin Rug" is sometimes used; but this is simply because the first products of this kind to be shipped to America and Europe were shipped from the port of Tientsin. The place of origin of these same "Tientsin Rugs" might well be in Peking or somewhere in Mongolia, as the methods of manufacture are the same for the whole north of China. Due to abnormal conditions created by the war, the old centres of supply in Turkey and Persia were practically closed; and, in consequence, the Chinese rug came to have a demand and received a publicity all out of proportion to what would be the case under normal conditions.

Probably the greatest number of Chinese rugs exported for foreign use are made in Tientsin, Peking and vicinity. Small rug factories are located in Kalgan and along the Mongolian border. In the strict sense of the term it is a misnomer to call most of these weaving establishments by the name of factory as they employ but five or six workmen. In the extreme west of China, the cities of Hami, Kotan and Kashgar produce a very fine grade of rug but very few of these find their way to the foreign market. There are also carpet factories at Kweihwating, Saratsi and Paotowchen in Shensi province. Smaller centres of rug-making are located at Paotingfu, Mukden and Shanghai; but the bulk of the commercial product is made at the two large population centres of the north under the direct supervision of the foreign buyer or expert.


The Interior of a Rug Factory

History of the Chinese Rug

Experts differ as to how long ago the Chinese began to make rugs. There are some who think it is indigenous to China and others who maintain that it is an acquired art. Nevertheless, it is safe to say that like the other arts of the flowery republic, Chinese rug-making is of very great antiquity.

The Chinese rug was not originally designed as a floor covering; but was used upon the *k'ang*, a sort of divan. It is by means of the *k'ang* that the Chinese family in the north of China is able to keep warm during the long winter months. This couch-like arrangement is made of bricks or mud; and is an indispensible part of every Chinese household. It is built across one end of the room. In winter a fire is kept burning underneath; and the members of family spend a great deal of their time upon the *k'ang*. Among the poorer classes the only covering of the *k'ang* is a coarse piece of matting. In the homes of the wealthy classes, rugs generally serve as coverings. Thus the original purpose of the Chinese rug was utilitarian rather than ornamental. To-day, in Western China, travelers carry their rugs with them to spread upon the *k'angs* of the Chinese inns. These inns furnish no luxuries in the shape of bedding. The guest is supposed to carry it with him. These rugs are known as "Travelers' Rugs": and are of various designs, generally depicting scenes which the Chinese traveler is liable to meet with upon his journey. The boatman on the Yellow River in Kansu carries his rug as a necessary part of his outfit. He squats upon it by day and sleeps upon it by night. These rugs are made from the best wool; and are generally handed down from father to son. Age seems to add rather than detract from their beauty in lustre and tones of color.

A later development was the use of the rug as hanging in temples and palaces. Other uses were made of it in the form of small squares for chair coverings and for saddle cloths.

As the art of rug-making advanced much thought and time was given to the designs of these pieces as they were supposed to have a great deal to do with the future happiness of the recipients.

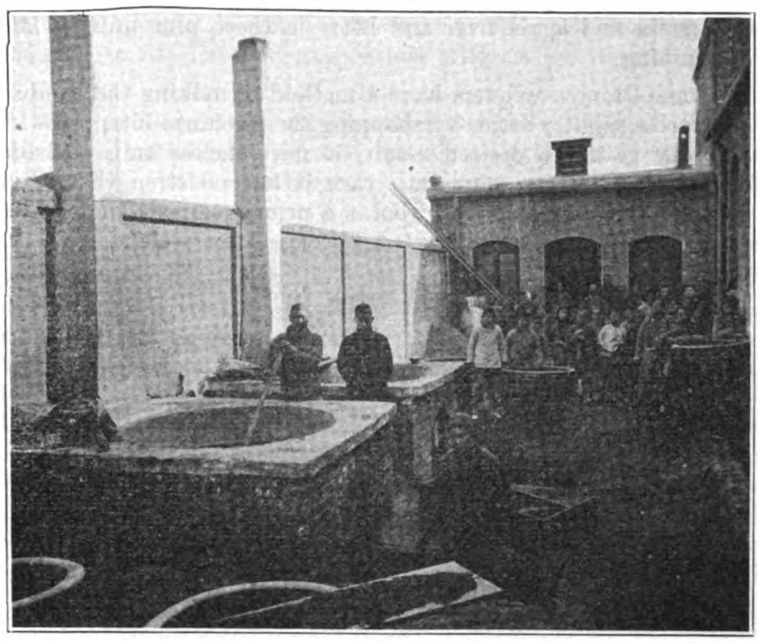
Antique Rugs

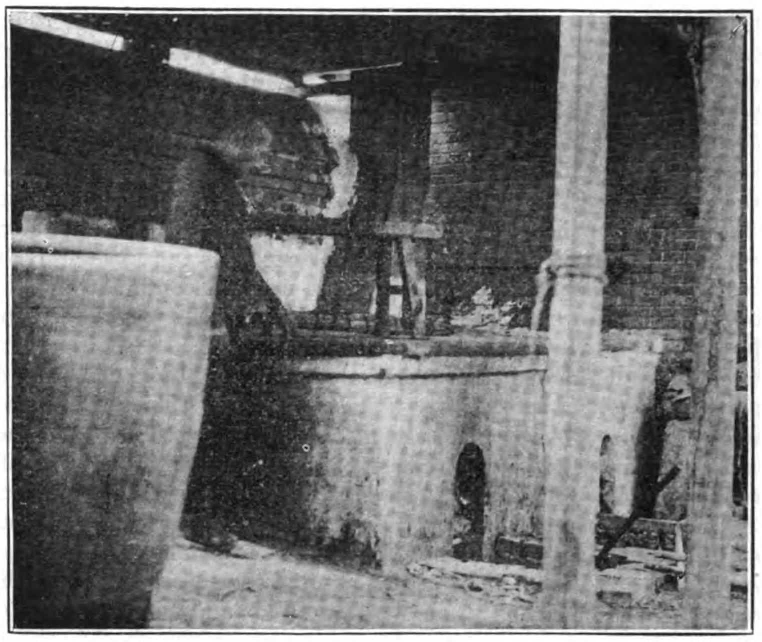
The antique rugs belong to three periods of Chinese history: the Ming; the K'ang Hsi; and the Ch'ien Lung. Marco Polo, in visiting the palace of the great Khan, or Kublai Khan as he is known to history, speaks of the beautiful rugs of the palaces; and mentions pieces inlaid with figures representing birds and beasts. Kublai Khan issued in the Yuan or Mongol dynasty (1260-1368), which preceded the Ming; and by reason of his conquest of western nations; brought into China a reviving influence from the outside. New arts were introduced to the Chinese, and the stagnant pool of Chinese life untouched for centuries from the outside experienced a brief renaissance. Arabian and Persian art had a great influence in the time of the Mongol. This influence was felt in all branches of Chinese art, but unfortunately no example of the rug-maker's skill has survived to the present day. The Ming dynasty was a pure Chinese dynasty, and was founded in 1368 A.D. From the middle of this dynasty art suffered a "reversion to type," which was due to a servile imitation of old master and the blind following of set rules and cañons. There are very few rugs of this period to be found. They are coarse in texture with plain geometrical figures more or less simple in color and regular in design. The Manchus began to rule China in 1644 A. D. K'ang Hsi was one of the strongest and most brilliant of the Manchu rulers. The rugs of this period have elaborate geometrical designs and are very closely woven. The Ch'ien Lung period begins with 1736 A.D. This emperor imported weavers from the west. The rugs of this period are generally floral in design with medallions. The outer borders of the rugs of this period are generally a deep blue. This was China's golden age in the art of rug-making. The designs of the later epochs are difficult to classify.

Connoisseurs and rug collectors have made antique rugs a rare article, and to-day there are doubtless more of these works of art in America and Europe than in China. But in remote places some old Mongolian rugs are still to be found. These were originally made in China and supplied to the Mongols for use by their princes, high lamas and in the temples.

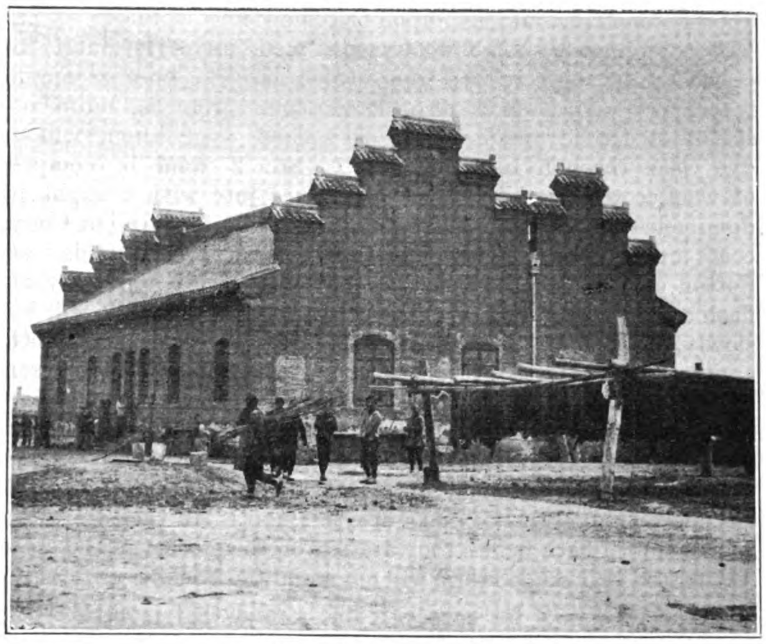
Wool

Mongolia with its bands of nomadic herds and their flock furnish an abundant supply of wool for the demands of the local



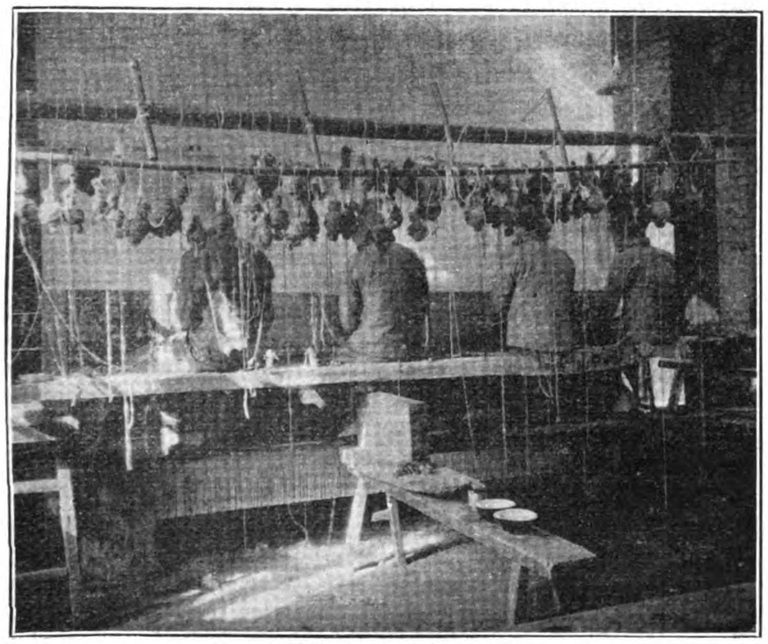


Two Types of Dye Vats in a Rug Factory

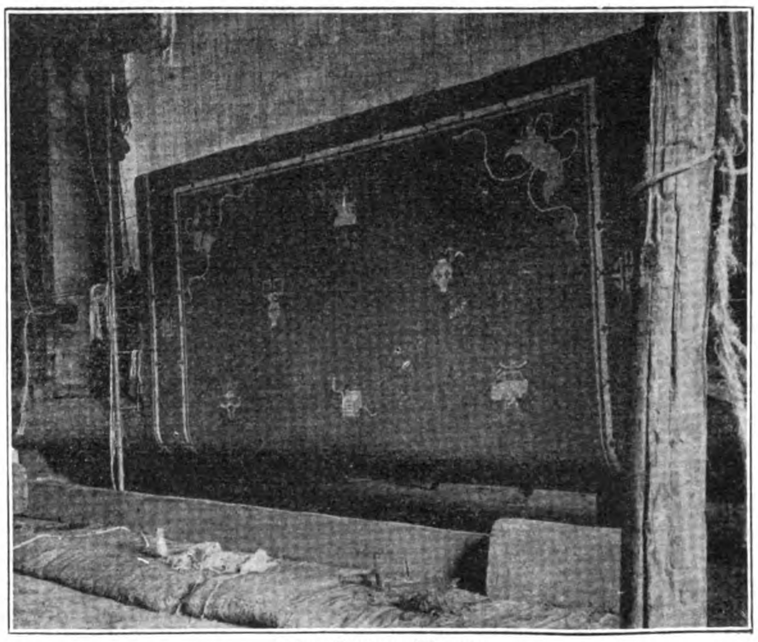


A Tientsin Rug Factory

Drying the Dyed Yarn



Weaving the Design



The Design Woven

trade. Caravans of camels, sometimes as many as five hundred in a caravan, arrive at Kalgan with immense cargoes of wool. This wool is picked up at different points in the interior of the Mongolian tableland. It is then shipped by rail to Peking and Tientsin.

Different kinds of materials are used in the manufacture of the Chinese rug, the principal one being sheep's wool with camel and goat's wool ranking next in the order of importance. Sometimes rugs are made from silk ; but do not make suitable floor coverings, and are rather used for coverings or tapestries. Hair, cotton, hemp and jute are oftentimes used in combination with a little wool to make a cheap grade of rug. One must be a good judge of wools in order to be a judge of rugs. It is often very difficult to distinguish hair from wool. Wool often can be distinguished from hair by its softness and elasticity. Under the microscope, a fibre of wool remotely resembles in appearance a pine-tree cone with overlapping edges or scales. It shows a "highly serrated surface." "A fine grade wool will have nearly three thousand serrations to the inch and a diameter of one-two-thousandth of an inch to one-three-thousandth of an inch, while a poor grade will only have about a fifth as many serrations to the inch ; and a diameter of only one-two-hundred and seventy-fifth of an inch." The difference is eight or ten fibres of fine wool to one of coarse in the final make-up of the rug. In the fine wool rug there is everything to be desired ; retention of color, resiliency and lustre which is not the case in a cheap grade rug.

There are the spring and autumn sheep's wool, and sometimes the spring sheep wool combings and lamb's wool. The later is sheared from the young lambs at about age of eight months. The Mongolian shepherds are adept as shearsmen and the fleeces are skilfully sorted. After the shearing process, the wool is sold to merchants, traders or rug-makers. Foreign wool experts say that Chinese wool is not quite as high-grade as that produced in the countries where they specialize in stock breeding.

The craftsmen in Western China are more careful in the preparation of the wool which they put into their rugs. Every craftsmen has a different method of treatment. After the sticks and foreign substances are removed comes the washing and scouring. In this process there also exists a variety of treatment. The general method of procedure is to wash the wool many times without allowing it time to dry. It is then placed in the tubs in which a bean known to Chinese is placed ; and the mass is pounded and boiled until the wool has been entirely cleansed. This bean cuts the grease. If any grease is left in the wool, the dye will not take as well as if the wool were all free from oils or fats. A great deal also depends upon the quality of water used in the washing. Soft water is the thing desired as hard water necessitates the use of potash. Potash cuts the wool in such a manner as to decidedly shorten the life of the rug. Some Chinese rug-makers have been known to use lime. This also injures the wool. Soap is sometimes used to clean the wool ; but this is more or less expensive.

The washing process finished, the wool is then exposed in the sun to dry. In the eyes of a careful Chinese craftsman this demands an equal amount of attention. After passing through all these processes the wool is then weighed ready to be picked and carded. There is considerable difference between the weight of the fleece when it come from the hands of the shearer and the residue that is left after it has passed through the many washing and drying processes.

The methods used for loosing the wool from the mats in which it is left after drying are two. One which is in general use, is a huge bow made of some strong hard wood which varies in size from six to ten feet in length suspended by its middle from the ceiling so that the card made of gut just touches the heap of wool. The picker who is generally a boy is armed with a wooden mallet which he plies in staccato time upon the bowstring. The vibration of the cord whips the wool loose and flings it aside wisp by wisp. The other method, which is seldom used, consists of a long block of wood or a wooden frame from which protudes long perpendicular pins. The boy apprentice squats on the ground and draws the wool again and again over and between these pins until it is fit for spinning.

Some Chinese weavers have a method of making the combing out process slightly easier by chopping the wool into bits, but while this may gain the desired result, it nevertheless ruins the long fibered wool. When spun into yarn it has no strength to hold together, and a long fibered wool is a prime requisite in good rug-making. This can be prevented by close supervision.

Sometimes the wandering shepherds of Mongolia carry a small spindle and distaff, and twirl the spindle as they tend their flock, especially near the Kansu border, where rug-making is an important industry. Some of the wool, however, is spun by the old men and women in the border villages. Each spinner strolls about the village with a wad of raw wool and a hand spindle, and by the mechanical twirling of the spindle gradually accumulates a ball of yarn, meanwhile entering into a lively exchange of village gossip. Thus the Chinese rug is a hand-made product from beginning to end. This yarn is in great demand but is bound to be limited in amount.

The Chinese weaver in the treaty ports if left to himself will produce an inferior fabric. The Peking weaver classifies his wool into three grades. His No. 1 is the best grade of wool ; and may differ greatly from that of another shop depending altogether upon his honesty, and also upon the knowledge of the prospective buyer. In general No. 1 wool yarn is made up of the finest kind of wool ; and entirely free from coarse hair-like fibre so common in cheaper yarns. It is also better spun ; that is, uniform in size and free from bunches of matted wool which will not dye clear through like the No. 1. No. 2 wool is composed of wool, cotton and hair and sometimes jute with a slight predominence of the first. The cotton linings of old worn-out Chinese coats are commonly pulled out and mixed with second grade wools. Cotton can be detected by applying a match. If it burns with a flash and leaves no remains, it is cotton. If it is wool, it will burn slowly, gives off an odor ; and deposit small bits of carbon. Cotton and hair will not absorb the dye as well as pure wool and presents a dull dead appearance after slight use. The pure wool rug as it ages increases in the beauty of its tones and luster ; while the hairy textured fabric will dull down and wear off rapidly. No. 3 grade wool is a compound of a very little wool, cotton and a considerable quantity of dog's or cow's hair. All rugs are treated to a chemical bath before they are put on the market in the states. The cotton-hair-made fabric will not stand the washing process.

The best wool for rugs is a fine strand that is entirely free from hair, cotton or matted wool. The best yarn is that composed of but few small strands. In making rugs of coarse weave the yarn can be woven in double or triple to each knot ; and the effect on the surface of the finished rug is far better than if a coarse strand yarn of the same wool is used.

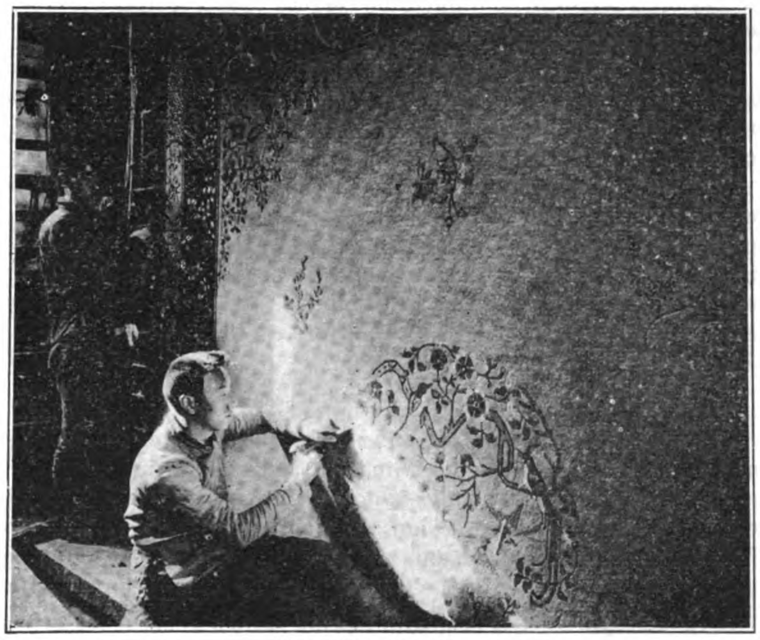
Dyeing

From the Chinese point of view the dye is one of the most important considerations in the make-up of a rug. In Western China we find that the craftman whose family has doubtless been in the business for generations takes a greater pride in the production of a certain color than do the newly established rugmen in Peking and vicinity. Ningshia dyes never fades, so the saying goes in China. Yet the native dyes used in Peking, if properly set, will outlast the carpet Providing the dyer does his work honestly there is nothing that has yet been discovered that will bleach the rug without ruining the fabric. The rug can be boiled to shreds without effecting the dye in the least.

Before the war when analine dyes were much cheaper, some native rugmen preferred to use analine dyes because it simplified the process and was less expensive. The analine dye product quickly fades and will not stand up under the washing process. There are still some analine dyed products to be found, and the

native rugmen occasionally foists one upon the unsuspecting tourist who has the temerity to buy without the intervention of an expert.

Every rug-maker dyes the yarn to match the colors in the designs which are submitted. At one dyeing he must make enough to finish the rug otherwise there is a variation in the color and the rug is streaked. The yarn is dyed in large iron cauldrons in which the dye is first made. How long the yarn must remain in a given dye demands upon the dyer's skill. The skilled dyer times his work just like a photographer times his photographic plate. The dye should never he wrung from the skein as this results in uneven distribution. Sometimes it is rinsed several times in cold water before it is hung up to dry. The master hand knows the exact moment when the yarn has finished hanging in the sun. The dye-maker has no books or recipe. He carries all his formulas in his head. There is generally displayed at some place in the shop a great number of small patterns showing all the different colors and tints of which that particular proprietor is master. When a rug-maker receives an order for a rug the whole supply of yarn to be used is dyed and set. It is then displayed pending the buyer's inspection before the weavers are set to work. If a particular shade is sought the dyer will experiment until the required tint has been found.



Trimming the Rug

Dyes

The old Chinese rug-makers while masters in the art of color-making confined themselves to a very limited schedule of colors. This has been followed to a greater or less degree by the moderns. In the use of blues and yellows the Chinese artisan doubtless stands pre-eminent. Yellow has had greater significances on account of its association with the imperial house. The use of the true imperial yellow is very rare although an endless number of shades in this color are designated imperial. The reds sometimes have a yellowish hue. There are many shades of salmon pink and reds. The salmon pink is produced from species of redwood grown in Western China.

Minerals are scarcely, if ever, used. The dyers of Ningsha in Kansu are famous for their beautiful shades of red. This color is produced from a berry which is grown in the province. Red is also produced from a wood grown in China which the rug-makers call redwood. Madder, rubia cordifolia, is a creeper the stems and roots of which are ground and boiled producing a red that is used as the basis of many shades. It is also said that some of the old craftsmen occasionally use sheep's blood to produce a deep vermillion. Perhaps the best known red dye in China is the saf-flower. The seed of this flower was said to have originally come from Turkestan.

Brown comes from the dye yam, or *shu-liang*, as the Chinese call it. It produces a dark brown color, and is widely used in China in the dyeing of cloth. If a darker shade is desired gallnuts and alum are used. Acorn husks are sometimes used to produce this color.

Blue comes from the indigo plant. One of the many varieties which grow in China, the polygonum tinototium, is grown in the northern provinces. The use of blue is rather a difficult and tedious process. If the work is carelessly done the blue does not go clear through, and the yarn when woven into the rug and clipped off shows a white spot in the centre of the strand. If a rug is made up of such yarn it produces a very disagreeable effect. Most of the blues used by the Chinese have indigo as their basis ; and this in combination with other materials produces all the shades known.

Purple is produced from hollyhocks and from the bark of lithospermum erythrorhison. The coloring matter is brightest if the plant is dug up in early spring.

Yellow is obtained from the buds of a large tree known as sopora japonina widely scattered over China. Lotus seed also produces a yellow as well as an olive green. Some craftsmen first dye the yarn a fast yellow. When it is set, it is dipped in red and exposed to the air for a very long period. As a result the red fades and the yellow comes out. There remains just a blush of red ; an effect that is very pleasing to the eye. Green dyes are obtained from rhamus tinctorius and other species of buckthorn. Indigo and yellow produce a green dye, but this color is very seldom used in Chinese rugs.

Black is produced from gallnuts. When mixed with cochineal and other substances the powder from the galls produces grey, brown and fawn tints. Black is also obtained from pomegranates rind and vinegar.

Rugshops

When one sees the dark holes and small places in which most Chinese rugs are produced the wonder grows as to how anything so beautiful could be produced under such an environment. Sometimes the rugshop will be found in the rear of another shop and can only be reached after wandering through courtyards redolent with smells peculiar to Chinese surroundings. In Chinese-owned shops, sometimes three or four looms as the press of work demands are crowded into a small ill-lighted, badly ventilated hovel. These places scarcely ever boast a wooden floor. Sometimes thirty or forty little urchines ranging in ages from ten to eighteen years of age work in one small room in the semi-darkness or by the flicker of a smokey wicklight. In the minds of most native rug dealers a well-lighted shop is something that receives no consideration. These youthful workers sit in a row on a plank fixed like a scaffolding in front of the large wooden loom or frame. They toil from daylight until darkness without so much as whisper : happy to have at place to sleep and enough poor "chow" to eat. Other shops only have five or six apprentices. Again a shop may have as many as a hundred weavers. The proprietor merely supervises the work and deals with the buyer. The employees live and sleep on the premises. A few shops under the influence of the foreigner employ only adults ; and have modern up-to-date plants that are well lighted and well ventilated. Occasionally a courtyard may contain the complete plant for preparing and dying the wool as well as weaving the rug but the majority of the shops in Peking and Tientsin are very small and merely weave the rug from the design which is submitted by the weaver.

Weaving

The Chinese rug, like most Oriental products of this kind, is not woven but tied. The principal mechanism is the left fingers of the small apprentices. On a heavy wooden frame reaching from the floor to the ceiling is stratched the cotton threads like

the strings of a harp. The small hand painted design is submitted to the rugman who sketches his design on white paper according to the actual scale of the rug. It is very essential that the designer be a skilful one ; if he is a poor one the curves are ungraceful and the details of the various patterns are carelessly drawn all of which shows on the finished rug. This pattern is worked in and out of the strings of the warp. When it is in position it is painted onto the warp with black ink. The design is then removed and the workers set to work tying the knots and cutting the string.

Strickly speaking there is no woof ; but the cotton filler is run in after each row of knots has been tied and pounded down. Each boy or workman sits in front of the warp. At his side are a few simple tools. Behind him on a level with the height of his hand is suspended the various balls of yarn which he is to use. He catches the loose end of the color desired and ties two strands of the warp together and cuts the ends of his knots with a small cleaver-like knife. When a row of knots has been finished a length of cotton filler is run through and pounded down with a heavy iron fork which is thrust into the warp. This completed, the row of tufts is then trimmed to even lengths which is one of the most difficult parts of the weaver's work. The object is to cut as nearly as possible the intended length of the pile thus obviating any unnecessary loss. After the rug is finished some proprietors clip the designs along the lines of the pattern, for example, outlining a flower or bird. As a result the pattern is brought into bold relief without the interjection of any other color. This is a Chinese invention which takes the place of the color outline. Each boy or workman takes two feet of rug and side by side they toil with no variety or change of position.

Dyeing of the wool, determination of prices per foot, and selection and completion of design are merely preliminary arrangements in the construction of the rug. In the case of the Chinese shops it is necessary to inspect the fabric at least once a day. If the work is not closely watched a few balls of inferior yarn will be worked in with the good wool in order that the weaver may make a little profit. It may amount to only a few cents or a dollar on the entire piece, but in the mind of this ignorant rug-maker he has beaten you at the game. This cannot be said of every Chinese shop, but it is so general that the foreign expert does not take any chances, and watches the weaving day by day. The poor wool can be worked in so cleverly in small flowers or other designs that the deception cannot be detected.

If the buyer is very particular about having the same design that he has ordered it is necessary for him to closely scrutinize the execution of his pattern. The Chinese are often obsessed with the idea that their way of doing things is better than the buyers, and will attempt additions and corrections both in designs and colors. If detected in time the error can be corrected, but the ripping out of work already done only serves to weaken the fabric.

The Chinese workman also has a habit of lapping the weft threads in the same spot each time in order to save himself the trouble of reaching too far one way or the other. This can be easily detected by looking at the back of the rug which shows a seam. This practice weakens the rug, as a whole.

Designs

The Chinese designer if left to himself adheres strictly to the conventional and symbolic figures which play such an important part in the history of Chinese art. If he is to make a bird rug it is sure to be a collection of every known species. If it is to be a flower rug it is sure to contain the flora of the entire country. If he is allowed to experiment with what he conceives to be foreign design, the result is apt to be hideous.

It is very hard to say just what effect continguous peoples have had on the designs of the Chinese rug. The old rugs from which many of the more modern products are but copies, scarcely ever show a composite design. This is due to the ability of the Chinese to take what they have found in the art of their neighbors, strip it of its elements and embody it in their own designs with a touch that is distinctly Chinese.

There is no doubt that Chinese patterns have been greatly influenced by Mohammedan designs. In northwestern China before the Mohammedan rebellion of 1871, a large proportion of the population were followers of the prophet. And it is here that some of the best Chinese rugs are woven. This region is in the direction line of communication across the continent; and in earlier times the old trade routes passed through these regions.

Buddhism was introduced into China 61 A.D.; and in three hundred years it had become firmly established. Its advent opened new vistas and developed greater possibilities in the artistic genius of the Chinese race. This influence of Buddhistic art is everywhere apparent. This in turn was influenced by Hindu art which also borrowed from the Greek. The Swastika, for instance, is of great antiquity and wide defusion among the different races. It is mentioned in the Ramayana and as an emblem of Thor even among the Teutonic races. In China it is the symbol of Buddha's heart. It is also used as a symbol for ten thousand years.

Values

What is the value of a Peking rug ? Only the expert who has studied the rug market in China can tell. The mere fact that a rug has 100,90 or 80 strings is not as important as workmanship, color combination, dyes, design and quality of wool. A rug may have an admixture of cotton, cowhair and jute, but the foreign merchant who deals with the Chinese can detect the counterfeit.

Some years back, a beautiful Peking lamb's wool rug made from the finest wool, best dyes and finest workmanship could be bought for fifty to fifty-five cents per foot. In 1915, when the market reached its highest point, the same quality rug could not be bought for less than $3.50 to 4.00 per foot. As with all things the market price is regulated by supply and demand. The arrival of four or five foreign buyers with orders for a few thousand square feet will send the dealers demands up 15 to 20 per cent. The Chinese dealer

The Completed Rug

drives a hard bargain, and the foreign buyer will find it to his advantage to deal with some of the foreign firms on the spot; and who understand local customs and have had experience in the rug business. Otherwise they are bound to have unpleasant experiences.

Many foreign firms in China have factories or control the product of Chinese factories, and by reason of their wide experience are in a position to guarantee their products.

Electric Grab Transporters for Han-Yeh-Ping

Grabbing Ore from Steamers Cheaper then Chinese Coolie Labor

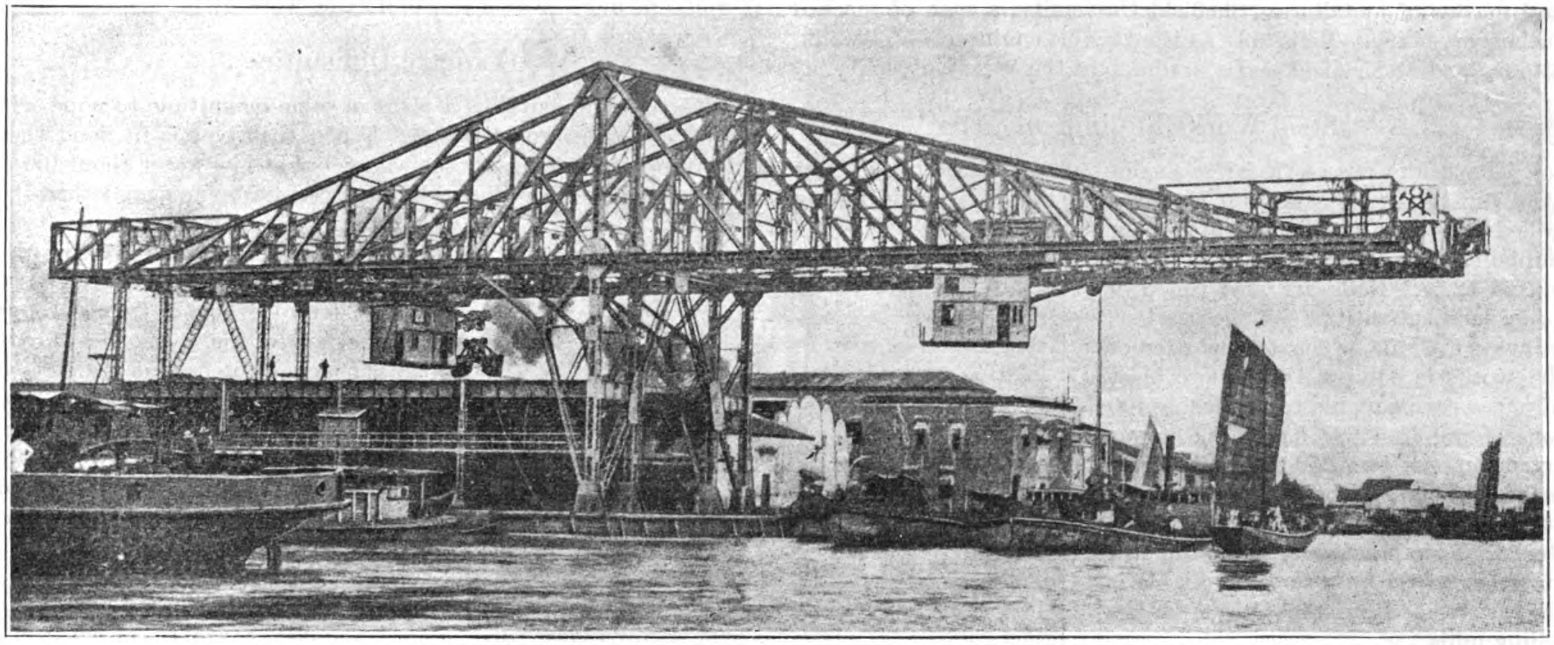
By H. J. Smith, M.I. Mech. E.

(Member of the Engineering Society of China)

FOR many years it has been an accepted fact that coolie labor in the East is far more economical for handling bulk commodities than modern mechanical devices, and as a result, the market for transporters, conveyors, ditchers, hoists and similar labor-saving machinery has not developed in keeping with the expanding demand for other engineering plants. It is a matter for congratulation to see this phase of engineering tackled in a forceful manner by experts with results which not only proves the old idea a fallacy, but that a real and profitable market exists in the Far East for such labor-saving machinery, if special attention and study is given to the subject. It is another testimonial to British enterprise that a British engineer has been the first in opening up the possibilities in this line in China. Mr. H. J. Smith, the head of the mining department of the General Electric Company of China, Ltd., and special representative of the Fraser & Chalmers Engineering Works, Ltd., recently contributed a paper to the Institution of Mechanical Engineers on "The Mechanical Loading of Ships," in which he dealt with four plants erected in cheap labor countries whose operation proved that bulk commodities such as coal and ore can be transported, loaded into steamers and unloaded at less cost than was possible previously by using native manual labor. One of the plants described in the above paper was the electric grab transporters installed at the Han Yeh Ping Steal Works by the Frazer & Chalmers Engineering Works under the direction of Mr. Smith. (*Editor, F.E.R.*)

The Han-Yeh-ping Iron and Coal Corporation is the largest industrial undertaking in China, having a capital of over 60 million dollars, and finding direct employment for about 23,000 persons. The shareholders and management are entirely Chinese, although the Japanese have lent financial assistance on terms exceedingly advantageous to themselves. The writer joined the staff temporarily whilst installing the transporters described below.

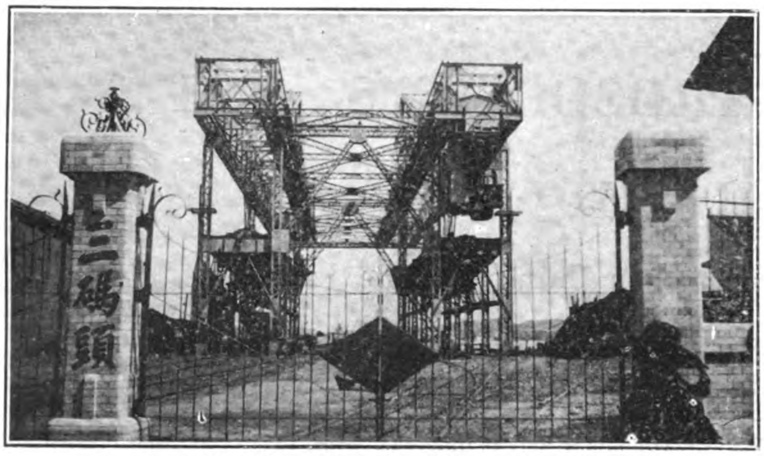
The properties owned by the Company are situated along the valley of the Yangtze Kiang, and they contain all the raw products necessary for the production of iron and steel. The iron and manganese mines—and also the limestone and dolomite quarries—are situated in the Tayeh district of the province of Hupeh; the principal deposits of iron being in the Lion, Shark and Elephant Hills, all adjacent and connected to the river bank at Sz-hui-yai by 19 miles of standard gauge railway, also the property of the Company. These iron mines are worked on the open cast system, the total ore in the three deposits being estimated at seven hundred million tons. The writer thinks it possible that the three bodies mentioned may be huge outcrops of an enormous deposit at greater depth.

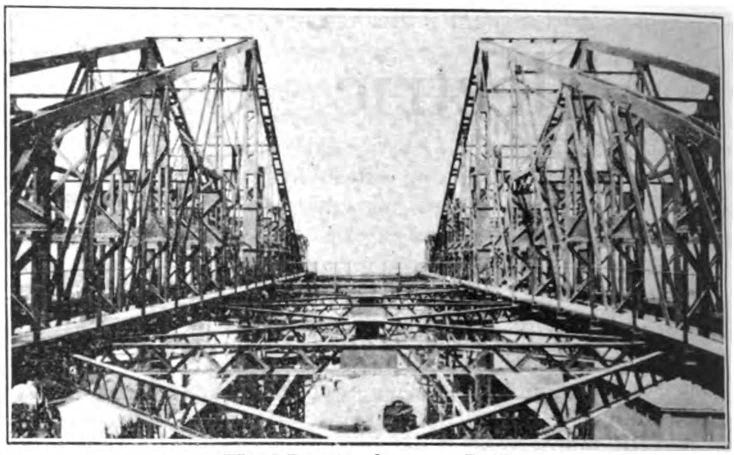


THE HAN-YEH-PING TRANSPORTER AT WORK
This plant was erected by Chinese labor, under the Sole Control of the Fraser and Chalmers Engineer, Mr. H. J. Smith, the only white man on the job.

Coal Mines and Coke Making Plant

The coal mines and coke-making plant are at Pinghsiang in the province of Kiang-si. The seventy miles of railway from the collieries to Chu-chow on the Siang-Kiang—a tributary of the Yangtze—where the wharves are situated for shipping coal and coke to the ironworks, was also built by the Han-Yeh-Ping Company. Part of the line has since been sold to the government, and now forms a section of the future Hankow and Canton Railway, the completion of which will bring Hongkong within nineteen days post of London.


View from the Rear after Erection


Wind Bracing between Bridges

The original estimate of 500,000,000 tons of coal in the Pinghsiang district may be modified by later figures; but the present output of 600,000 tons per annum could easily be increased by the introduction of more modern machinery and local management. The blast furnaces, the steel-making plant and the rolling mills are situated at Hanyang on the confluence of the Yangtze and Han rivers, which place, speaking approximately, is about midway between the deposits of coal and iron. These iron and steel works are under the superintendence of Mr. Z. T. K. Woo, doctor of science and master of metallurgy, Sheffield University, a man of marked executive ability. He is ably assisted by his engineer, Mr. Kwauk, also trained at Sheffield and a graduate of the same University.

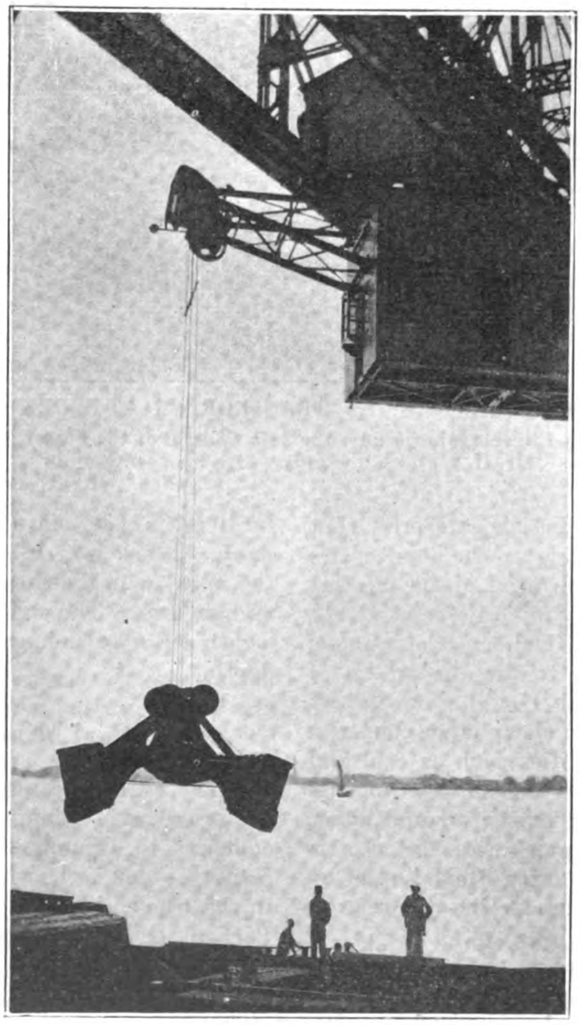
Steel Works Equipment

The works possess a fairly modern plant, consisting of four blast furnaces, seven Siemens-Martin steel furnaces, and a rolling mill which turns out plates suitable for shipbuilding and sections of all sorts up to 12-in. Rails are also rolled in fairly large quantities for the various railways in China. The older portion of the works is equipped with two blast furnaces each capable of producing 100 tons of pig iron per day. The newer extension has two 250-ton units, with turbo-blowers, turbo-alternators, and other details equally up to date. The steel is made practically from the raw material, as the only scrap available is the shearings from the output of the rolling mills.

The Ton-Tsu-pao Iron Works

The new ironworks now being built at Ton-tsu-pao, on the Yangtze close to the iron mines, are planned on a most ambitious scale. No less than eight 450-ton blast furnace units are projected, the first two of which are now being erected. The furnaces are of American manufacture, but the turbo-blowers for the furnaces and the turbo-generators for power purposes are being supplied and erected by the Fraser & Chalmers Engineering Works of London. The boiler installation is also of British manufacture (Babcock & Willcox). The mechanical appliances for unloading and loading the raw materials and finished products are being built in England.

All the ore, limestone, coal and coke for the Hanyang Works is carried from the Pinghsiang and Tayeh Wharves by the company's own tow boats and lighters, the total numbering 21 steam tugs and 180 lighters. The present output of iron and steel requires the unloading at the Hanyang Wharves of about 3,000 tons of raw material per day. Until recently this work was done by Chinese coolies, but the great rise and fall of the Yangtze river*—over 45-ft —was the cause of considerable trouble to these manual operations, especially in wet and wintry weather, and it was considered advisable by the Chinese management, in spite of the abundance of cheap labor, that it would be more economical to do this work by mechanical means.


Grab in Operation

Yangtze Difficulties

The decision entailed a plant of some magnitude to cope with the exceptional circumstances. When the river is in flood there is 25-ft. of water alongside the wharf, but at low-water about 100-ft. of foreshore is disclosed, and lighters can tie up no nearer than 130-ft. from the wall. This necessitated the building of cantilevers of considerable size and strength, capable of bearing large grabs at work 150-ft. from the face of the wall. The moving load is nearly 100 tons, and the stresses due to the operation of the grabs is severe, especially when the machinery happens to pick up the two 11-ton grabs simultaneously at full speed, whilst working at the extreme end of the cantilevers.

The cantilevers and anchor arms, together with the columns and bunkers have a weight of 530 tons. The total weight of the plant, including the grabs and machinery, is 680 tons. The four main bridge girders are 281-ft. in length, and 37-ft. in depth at the centre, each girder weighing approximately 100 tons. The bottom chord of the cantilever arms are 100-ft. above low-water mark.

When the grabs are working on the extreme end of the cantilevers there is an upward pull of 120 tons on the rear columns supporting the anchor arms, this being equal to 30 tons per column. The over-turning moment is safely counteracted by a continuous block of reinforced concrete, weighing 500 tons, which is laid under the four columns to act as foundation or loading as required. The six holding-down bolts to each

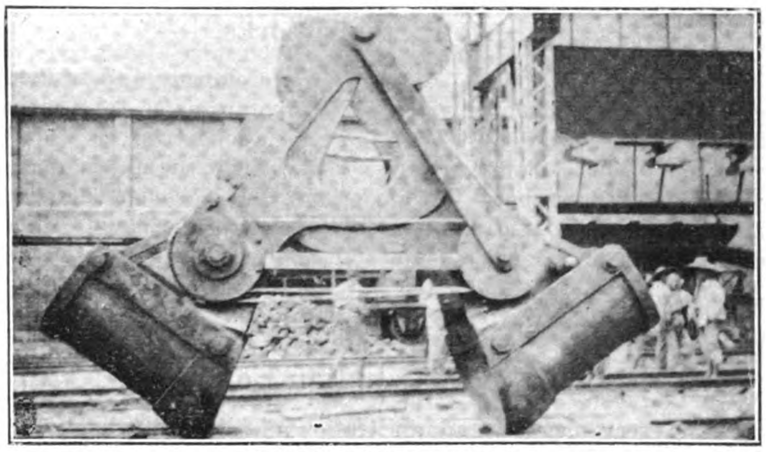
* The rise and fall of the river is not tidal, but is caused by the melting of the snow in the Himalaya mountains.

column base are carried down and anchored to a grillage which embraces the loading in such a manner that no fracturing of the concrete could endanger the safety of the plant. Actually there is rarely any overturning effect, because the nest of bunkers, which are firmly fixed to the main and rear columns under each transporter, are seldom all emptied of ore at the same time. The total capacity of these bunkers is 1,000 tons of iron ore. They serve to prevent any stoppage of the grabbing operations due to the shunting of wagons, but need not be used necessarily as the grabs can discharge their load direct to the 30-ton bottom dump steel wagons when the latter are available.

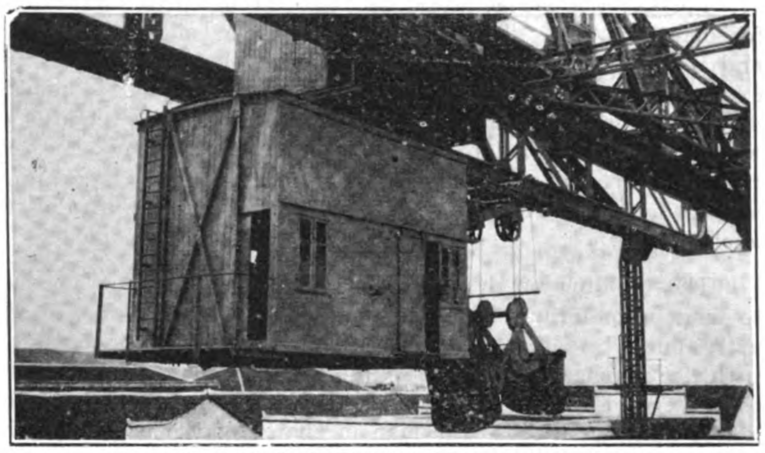
The maximum load on the four main columns is approximately 800 tons, or 200 tons per column. This weight is supported by a substantial concrete and stone-faced wall founded on the mud banks of the Yangtze. Considerable piling and grillage work was, of course, necessary to ensure stability, and the bank was afterwards well pitched with an apron of slag to prevent erosion. The writer made a careful examination of the work after the annual flood had subsided, and, so far as could be seen, the precautions taken were all that was necessary. The levels of the column bases were also checked without finding any settlement, unequal or otherwise.

Details of the Unloader

The unloader consists essentially of two transporters, 50-ft. between centres apart, braced together to act as one unit of great stability against wind pressure. Each transporter is fitted with a traveling carriage from which is suspended a crane capable of revolving 360 deg., whilst operating a grab weighing 7 tons when empty and 11 tons when full. The total weight of each grab and its attendant machinery is nearly 43 tons, so that the total moving load on the twin transporters, when the grabs are full, is almost 100 tons. The jibs which carry the rope sheaves for the grab ropes form part of the crane structure. Each grab is operated by four ropes, i.e., two closing and two dumping ropes, each pair being capable of acting as sustaining ropes. The under-hung portion with its grab and load is suspended from the centre of the traveling carriage by a large ball-bearing mounted on trunnions designed to ensure the weight being equally distributed on the four wheels of the traveler under all conditions of grabbing. As each grab is capable of traveling and turning a complete circle, the two working in co-operation can drop into any part of a ship's hatchway 90-ft. in length without moving the vessel. Or, when working separately, they can grab from two holds on smaller craft.



Traveling Cabin and Grab



Rear View of Grab, Weight of Empty Grab, 6 tons

The Electrical Equipment

The hoisting, traveling and slowing machinery is driven by separate electric motors, each set being controlled by one man, who travels in the machinery cabin with the grab, so that he has always a complete view of the operations.

The total power called for by the motors on the transporter is equal to 500 B.H.P. This is drawn from a turbo-alternator working close to the blast furnaces, where the boilers generate steam by burning the waste gases from the furnaces, and a small coal fire for auxiliary and ignition purposes. The high tension current from the alternator is converted by a rotary converter, fixed near the transporter, to 440 volts direct current, and is transmitted to the collectors on the traveling carriages by copper mains suspended the full length of the bridges by ears fixed to the underside of the cross-bracing.

The 170 B.H.P. hoisting motors are of the series-wound interpolar semi-enclosed type running at 600 revs. per min., which gives a rope speed on the drums of 190-ft. per minute. The automatic circuit-breakers were set to 318 amperes, and in all cases where they came into action on peak loads, the grabs were held instantly by the powerful solenoid brakes provided for the purpose. Even when the maximum load ran full-speed into the hoisting limit switches the result was the same, the motor being disengaged from the gearing just a fraction of a second before the brakes gripped. The traveling motors are of similar type 65 B.H.P. (115 amperes), and are geared to move the traveling carriage at a maximum speed of 740-ft per minute.

The 15 B.H.P. slowing motors can turn the grab through 360 deg. in 36 seconds, this being equal to a speed of 200-ft. per minute when measured at the maximum radius. The electrical control and brake gear supplied with the slowing motors was altogether too fierce in its action of starting up and shutting down for the work which had to be done by the mechanical portion and it was necessary to rearrange this on the site until the results became satisfactory.

Details of the Switchgear

The switchboards are placed in the lower cabin close to the controls so that the driver has command of all the instruments without moving from the footplate. Besides the usual power and lighting switches, hand-guard fuses and meter dials, the panels are fitted with automatic overload and limiting circuit-breakers, which bring all operations to a standstill without damage to the plant in the event of sudden incapacity befalling the driver. The difficulty of connecting the main leads from the trolley wire collectors on the traveling carriage to the rotating switchboard in the machinery cabin underneath was overcome by fitting revolving contactors over the centre of the ball-bearing races, and passing the internal wires down the hollow centre designed for that purpose.

The whole of the erection work and foundations was carried out by Chinese labor, the writer being the only European on the site.

Difficulties of Erection

The erection of the structure presented several unforeseen difficulties, because the material was shipped from England at the time when the minister of munitions prohibited the export of steel. The contractors (The Fraser & Chalmers Engineering Works) made every effort to complete the plant, but a number

of the smaller details and all the tools for erection had to be short-shipped. Making the tackle in China entailed a lot of work, the biggest job being the construction of two traveling derricks with 50-ft. jibs, capable of handling 5 tons each, so that the corbelling of the two cantilevers could proceed simultaneously. A lattice steel mast, capable of lifting 5 tons to a height of 65-ft., together with all the purchase tackle necessary and three double-geared hand winches, were also made on the site. These tools were built whilst work on the foundations was in progress, and the tackle required first was completed in good time to commence work on the superstructure.

After the columns and bunkers had been erected the timber falsework was built up from the latter to carry the bottom booms of the anchor arms. No special timber could be purchased for the falsework on account of the war shortage, but fortunately the sleepers required for the trackwork round the plant and lines leading to the furnaces arrived, and were utilized for the purpose with good and economical results. The work of driving 75,000 ⅞-in. steel rivets on the site by Chinese labor was completed without difficulty, although a larger percentage failed to pass inspection, and had to be cut out, than is usual at home. But the final work was creditably done.

Deflection Tests

Finally, the bridge work was put through exhaustive tests for deflection, etc. The test load was moved along the bridge and readings taken at each vertical until the load reached the extreme end of the cantilever, where it was allowed to remain 40 hours before the final readings were taken at the verticals as the load was returned to the end of the anchor arm. By this means each panel and the nose of the cantilever showed 24 readings under varying conditions, with a like number at the centre of the anchor arms.

The building of the plant was completed without accident to men or material. This immunity was accounted for, in the native mind, by a liberal sprinkling of the water under the cantilever with rice purchased by general subscription of the gang to appease the water gods. This unusual method of insurance on one occasion led to fighting, because the man in charge of the pontoon—who was deputed to do the sprinkling—was too liberal with the rice around his own craft. The plant went to work without a hitch after the Chinese chosen as drivers had learned how to manipulate the controls, which they did rapidly.

Owing to the grabs having to be hoisted 75-ft. at each lift when the river is low, and then travel from the end of the cantilevers to the bunkers and back, a total movement of 650-ft. for each grabbing without reckoning the slowing movements and the smallness of the craft necessary to suit the river conditions, the rate of unloading is not so rapid as would otherwise be the case. The machinery is designed to unload 100 tons of iron ore per hour with each grab when working on ocean-going steamers, or craft of equal capacity ; but the best results obtained by the Chinese drivers when unloading the small lighters was 700 tons with one grab in a working day of 10 hours.

When the writer left China the plant had unloaded 270,000 tons of ore, coke, coal and limestone without an accident of any kind, and travelers from England to Central China were somewhat astonished to find unloading appliances there equal to anything that could be matched against them by any similar undertaking in Great Britain.

In conclusion, the writer would like to make a point of the fact that an important undertaking under Chinese management and in China, where labor is plentiful and cheap, have found it worth while, after a lengthy trial of manual labor, to replace the coolie by a mechanical contrivance for unloading material in bulk.

The Chemical Industry in Japan

Dr Takamatsu, director of the Tokyo Industrial Laboratory, in a official bulletin, says that it is necessary to establish a large government laboratory where the necessary experts can be trained if Japan is to hold her own in developing her chemical industry. Before the war, writes Dr. Takamatsu, Japan had to import most of her dyes and chemicals, especially from Germany. During the war the law for the encouragement of the dyeing and chemical industries was passed, and in 1916 the Japan Dye-Stuff Manufacturing Company was established. Lack of funds and expert workers has hampered the activities of the company. Last year the imports of dyestuffs were very large, and they are, judging from prevailing conditions, likely to be much larger this year. During the war numbers of dyestuff works were started in various parts of Japan, but nearly all have disappeared since the depression set in. Those that still hold on are working on a very small scale, and have no permanent plans of business. The chemical industry, which is of so much importance to Japan, cannot be developed on such narrow lines, and the assistance of the government in the drection already indicated is urgently necessary. The Japan Dye-Stuff Co., it is reported, is contemplating the engagement of dye experts from Germany. Such a plan may also be adopted by other chemical works in the country, which feel the necessity of a thorough reform of the industry.

Horton Steel Works

The Canadian Chicago Bridge & Iron Company, Ltd. of Bridgeburg, Ontario, announce a change of corporate name to HORTON STEEL WORKS, Limited in honor of the late Horace E. Horton who founded the organization in 1865. Their main offices and works are at Bridgeburg, Ontario, where C. H. Scheman is general manager and Mr. C. C. Gregory is the manager of the plant. Their eastern sales office is at 260 Saint James Street, Montreal, Quebec, where Mr. G. S. Sangdahl is the district sales manager.

The Third Netherland Indian Commercial Fair

The very energetic administration of the Netherlands East Indies by the Dutch is well exemplified in the commercial fairs they have had in the past and in the one for which extensive preparations are in progress, to be held at Bandoeng (Java) in the second half of 1922. It is stated that the fair will have an entirely international character and it is intended not to make any restriction as regards the kind or the origin of products and commodities to be exposed. The government of the Netherlands East Indies have intimated that the fair being planned will be of greater proportions than its predecessors and that it will undoubtedly also surpass them in commercial importance. It will no doubt afford an excellent opportunity for all intending exposers of Far Eastern products.

Jeffrey Material Handling Machinery

The Jeffrey Manufacturing Company of Columbus, O., have just issued a new Price Catalog, No. 350, a handsome, well-bound book of over 200 pages, covering the many varieties of machines for the handling of heavy materials for many purposes and largely utilized in the cane sugar industry. The book contains illustrations, price lists and dimensions of Jeffrey chains, sprockets, conveyor and elevator details, transmission and gears. Illustrations and descriptions of their standard line of elevating and conveying machinery for every industry, complete coal handling equipments for boiler houses and tipples, mining machinery, such as coal cutters, crushers, pulverizers, shredders, portable loaders, etc. Those interested in such work can secure copies of the same by addressing the Jefferson Manufacturing Co., Columbus, Ohio.

Bridge Building in the N.E.I.

The Railway Bridge Across the River Serajoe on the Cheribon-Kroja Line of the Dutch East Indies Railways

THE bridge, represented by Fig. 1, was projected by Dr. Ir. J. H. A. Haarman, chief of the constructional department of the state railways in Java; it was constructed by the factory "De Pletterij te Delft, Holland" and erected by the staff of the constructional department. The bridge was finished early in January 1916.

The total length is 863 feet (263 M'), the spans are:

82 + 207 + 295 + 207 + 82 feet
(25 + 60 + 91 + 60 + 25 M')

The central part with a length of 229 feet (213 M') forms a connected but statically determinate system; to the arched bridges with a tension-chord, bridging over the side-spans, consoles have namely been added towards the centre, on the ends of which rests an arched bridge with a tension-chord of 233 feet 3¼ inches (71.1 M') point of support distance, see Fig. 2.

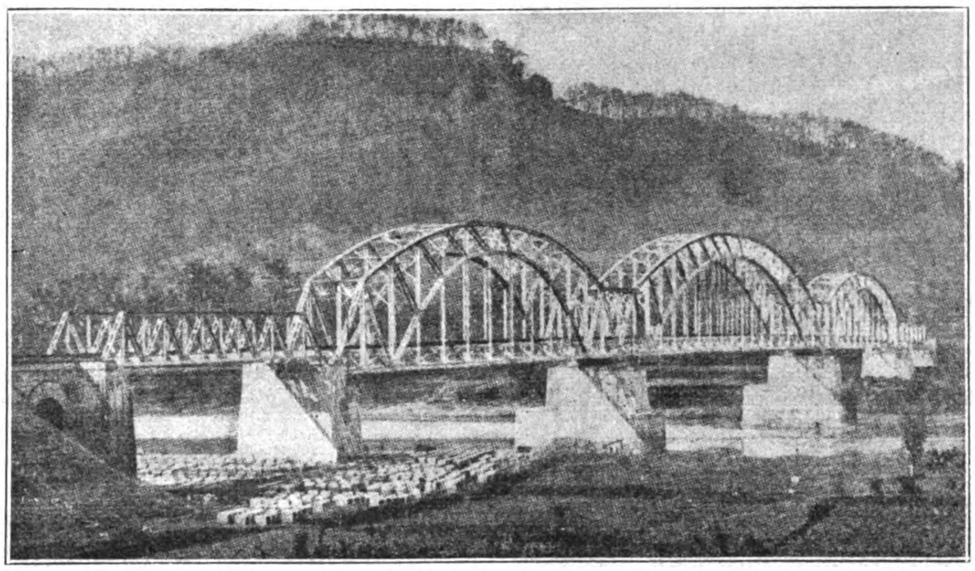


Fig 1. Railway Bridge over the Serajoe River, Java

The bars situated opposite to the bearings near the bearings of the inserted central span have performed their function during the erection, see Fig. 3, and after getting ready have been altered in such a way as not to convey stresses any more.

About the design and the way of erecting ample information has been furnished in the designer's work entitled: "The large Railway-bridges in the road Cheribon/Kroja of the State Railways in Java," published by J. de Boer at Tegal.

As particulars of the design may be mentioned among others

(*a*) the peculiar bar-scheme of the arched bridges with tension chord of the side-spans as is shown in Fig. 2;

(*b*) the junction of the stringers and the floor beams constructed like frame-work, where the stringers have been built into the floorbeams;

(*c*) the way of the bearing of the inserted central span of 71 M' on four movable bearings and the fastening of this span occurring there to one of the side-spans by means of a bar connecting two points of junction of the respective lower wind-bracings and conveying not moment but only forces in the longitudinal direction of the bridge, among others braking-forces;

(*d*) the end portals of the inserted central span, which have been constructed in such a way as to convey the forces of the upper wind-bracing of the central span to the

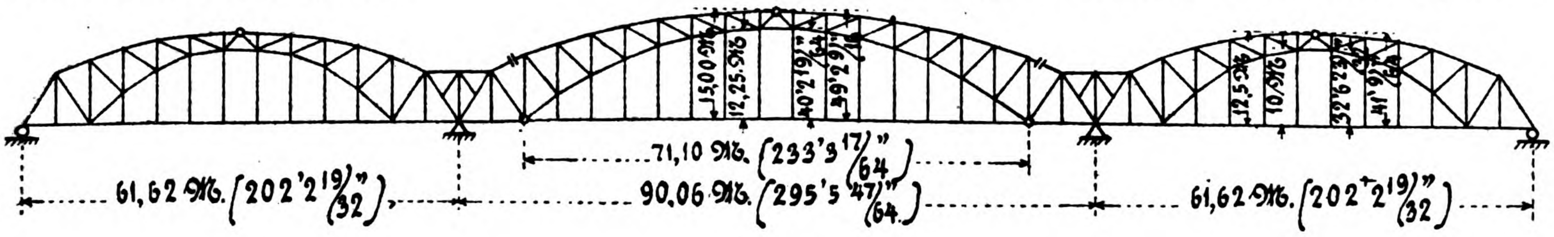


Fig. 2.

The load, upon which the bridge is calculated, consists of two locomotives and an indefinite number of wagons of the scheme sketched here: while moreover the regulations of the state railways of the year 1911 were acted up to.

The weight of the arched bridges is 571 (580) tons, namely two side-spans with flanges each 187 (190) tons and the inserted central bridge 197 (200) tons.

Locomotive with tender **Wagon**

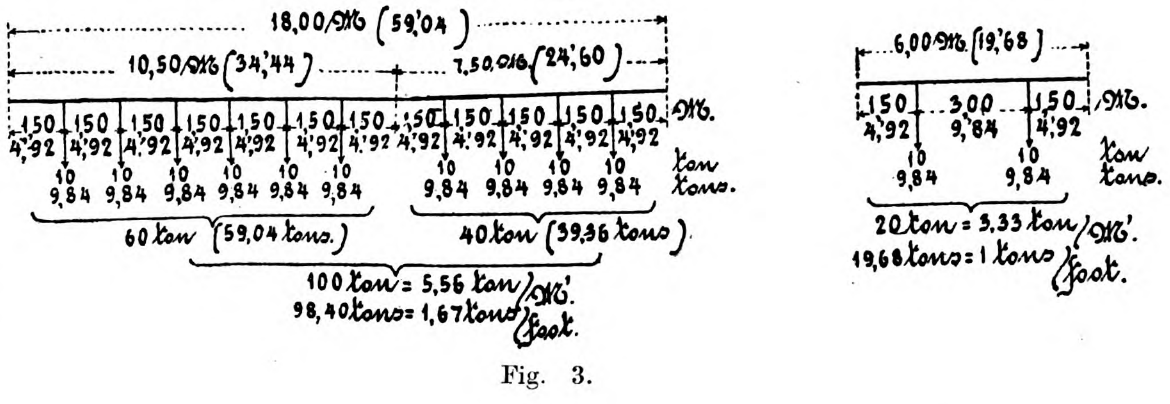
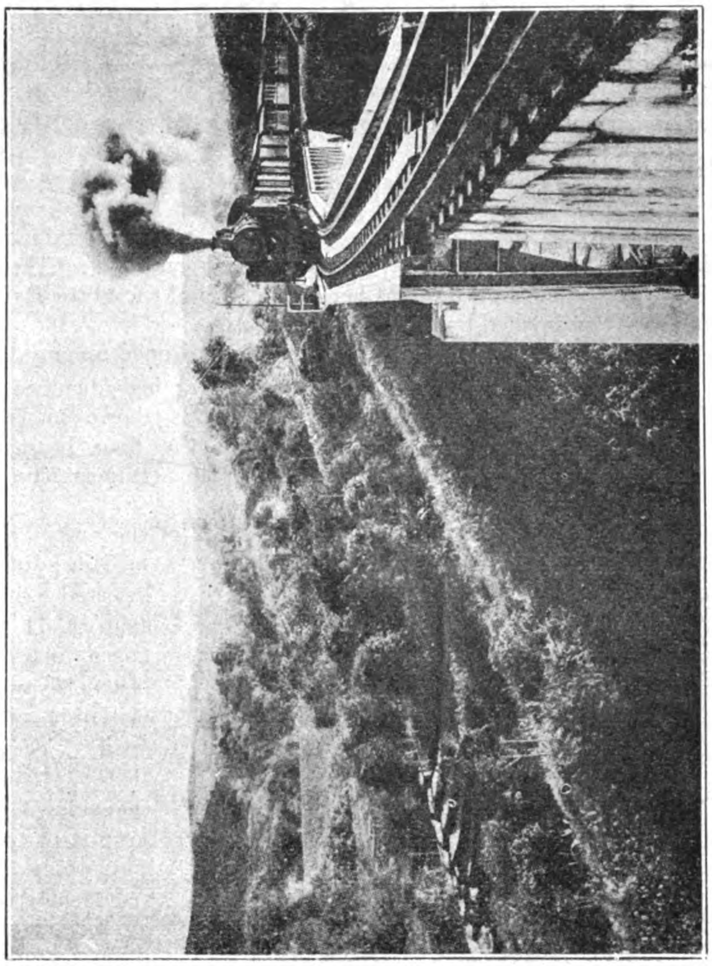
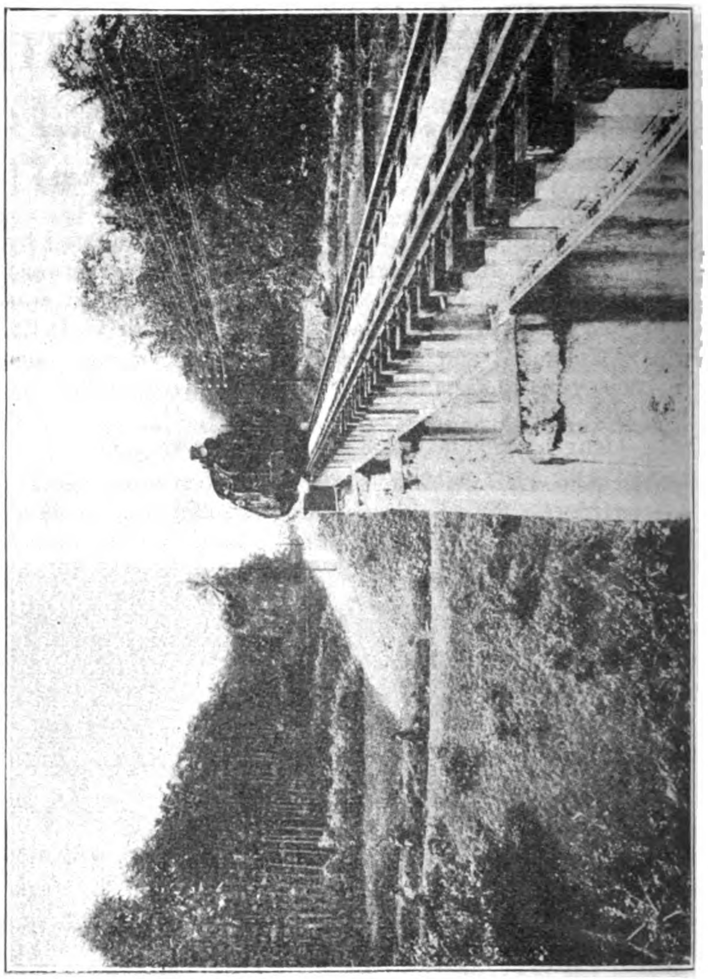
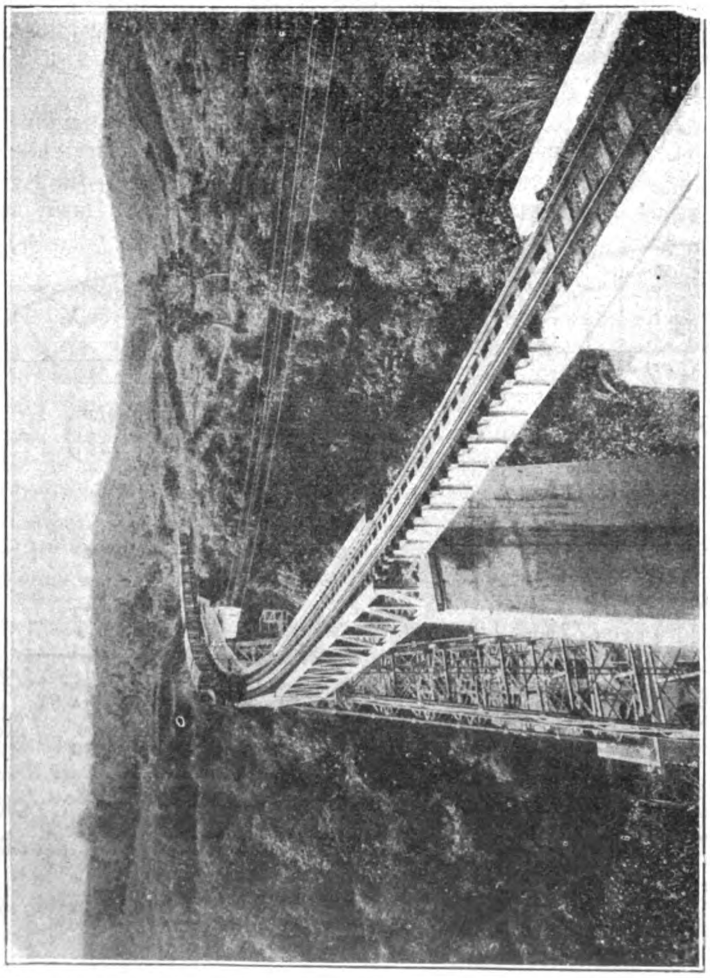


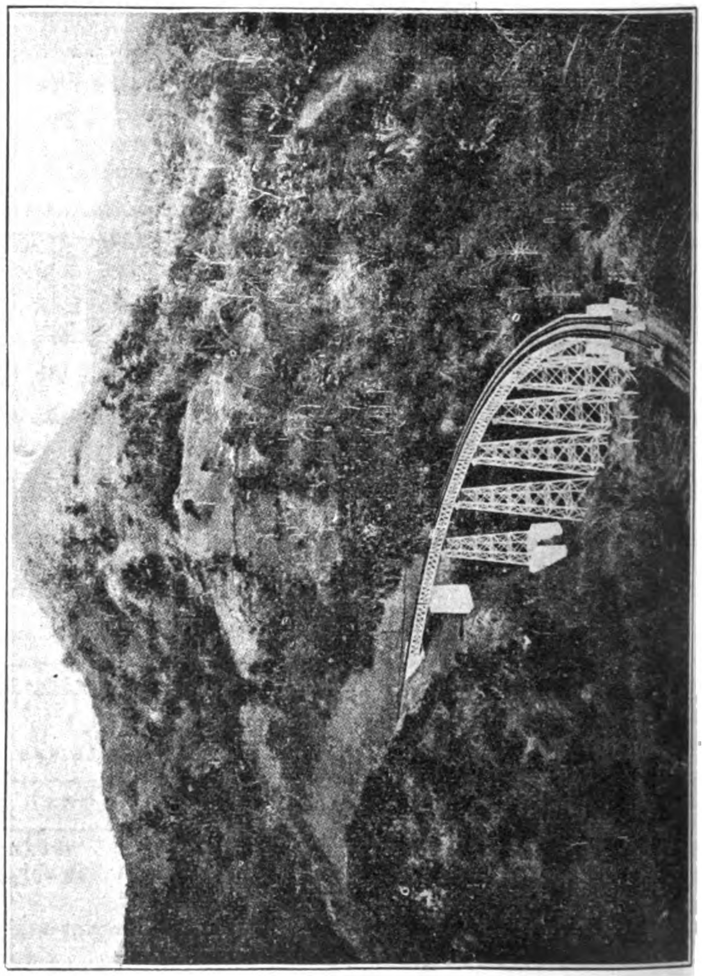
Fig. 3.

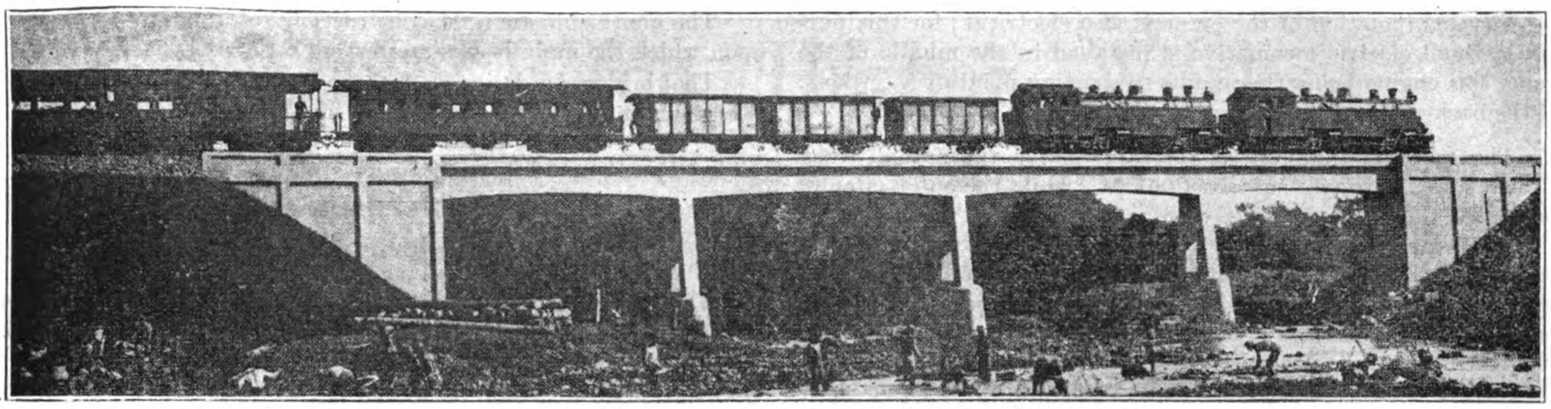
TYPES OF PIER BRIDGES ON THE N.E.I. STATES RAILWAYS











Reinforced Concrete Bridge over the Proepoeck River

bearings, without touching the trusses of the flange of the side-span, and to make possible a free change of angle of the inserted span with regard to the side span at the same time.

The erection of the bridge is remarkable in connection with the circumstance that the bridge has been built out on both sides and the designer felt so sure of an accurate erection that he had all the bars, so also those of the central field to be inserted at length, made fit to all the bolt-holes at the right measure before, and when building, really succeeded in inserting those bars of the central field perfectly fitting without even having to use a broach.

In the erection only Javanese workmen worked under the direction of Indo-European people all of whom had got their training in the service of the state railways at the constructional department.

The staff displayed an extraordinary desire to work quickly and well, the consequence of which was the completion of the erection of the superstructure in three months.

The money spent on this bridge is mentioned roughly below :

Purchase iron construction 659 (670) tons with transport		*f* 127,300
Preparatory work, false-work bridges of the side-spans...	*f* 20,844	
Installing and riveting of two bridges of 82 feet (25 M') width	*f* 765	
Installing and riveting of the arch bridges	*f* 2,1920	
Finishing permanent way, clearing work	*f* 5,050	
		f 48,579
	Total round	*f* 176,000

For bridge of 670 tons
So purchase per ton *f* 190. Erection *f* 72.50
Total ... ... *f* 262.50

Pier-bridges in the Line Bandjar-Parigi

In the line Bandjar-Parigi the ravines of the Tjipamottan, the Tjipembokongan and the Tji-keboejoetan are crossed by pier-bridges, respectively 310 M., 299 M. and 176 M. long. The height of the rail above the bottom of the ravines is respectively 38, 40 and 34 M. The bridges were planned and built by the construction department of the state railways and calculated on the load-diagram 1911 (see communication on the Serajoe bridge).

The piers are 12.09 M. long, measured along the centre of the track.

The are supporting bridges with a length of 12 M. and on either side bridges, 21.20 M. wide.

The total weight of piers and bridges is for :

the Tjipamottan ...	...	689 tons
the Tjipembokongan ...	...	644 tons
the Tjikeboejoetan ...	...	310 tons
One bridge 12 M. long has a weight	of	7.52 tons
one 21.20 M. long	of	20.7 tons

One pier of 4 stages has a weight of 34.23 tons, one of 6 stages of 47.44 tons and one of 8 stages of 63.70 tons.

The bridges of 20 M. are light, as the upper girder works at the same time as longitudinal beam. The piers have between the supports a connection, whereby the secondary tensions are almost absent.

The erection took place for these bridges in the usual manner by building first the nearest pier by means of a crane and by lowering the bridge of 12 M. by same. Afterwards the end of the crane was catched above the newly built pier and supported, the bridge of 21.20 M. then being lowered between this pier and the one before built.

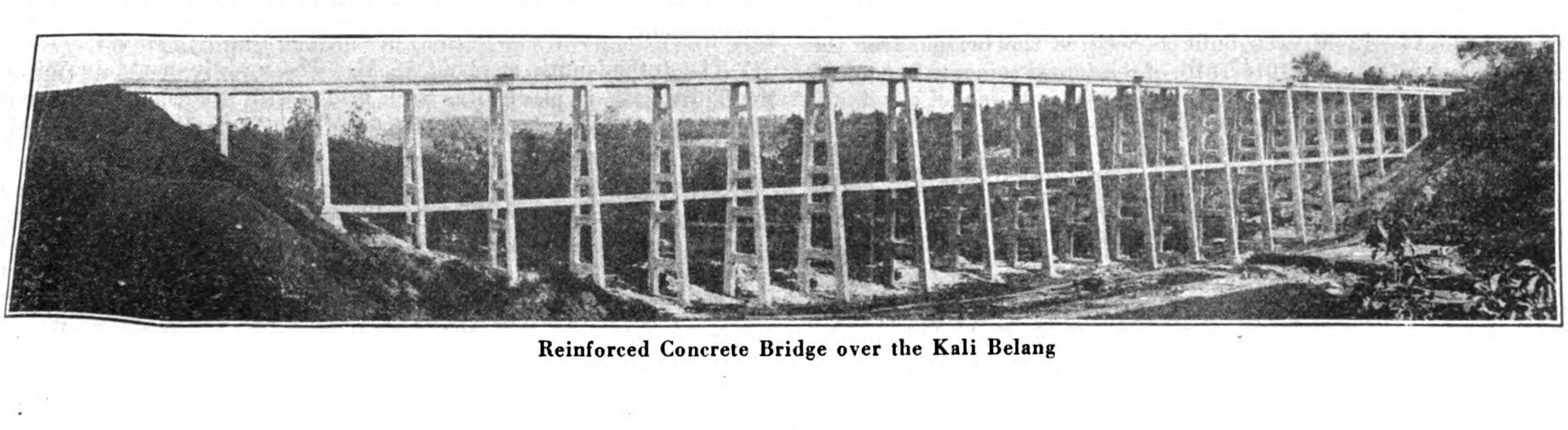
After the laying of the track, the crane was moved ahead.

This crane is 80 M., 32 M. long, of which can project out freely. The free end can support a load of 6 tons on one traveling crab. The crane is provided with two traveling crabs with a lifting power of 12 tons and two fixed winches with a lifting power of one ton installed ahead nearly 6 M. from the end.

The velocity of lifting and lowering is for the crabs 1.5 M. a minute for a load of 12 tons and 3 M. a minute for a load of 6 tons. The fixed winches are lifting a load of one ton in 5 and lowering the same load in 3 M. a minute.

The crabs have a maximum horizontal velocity of 20 M. a minute.

All movements take place electrically for the purpose of which an electric central-station with a benzine-motor of 20 H.P. and a dynamo of 52 amp. and 220 volts is erected on the back-end of the crane.



Reinforced Concrete Bridge over the Kali Belang

The manipulation of the crane is also electrical; for this purpose a small electric locomotive is installed in the middle of the crane, this engine being the middle supporting point of the whole. At the back-end are two traversing wheels.

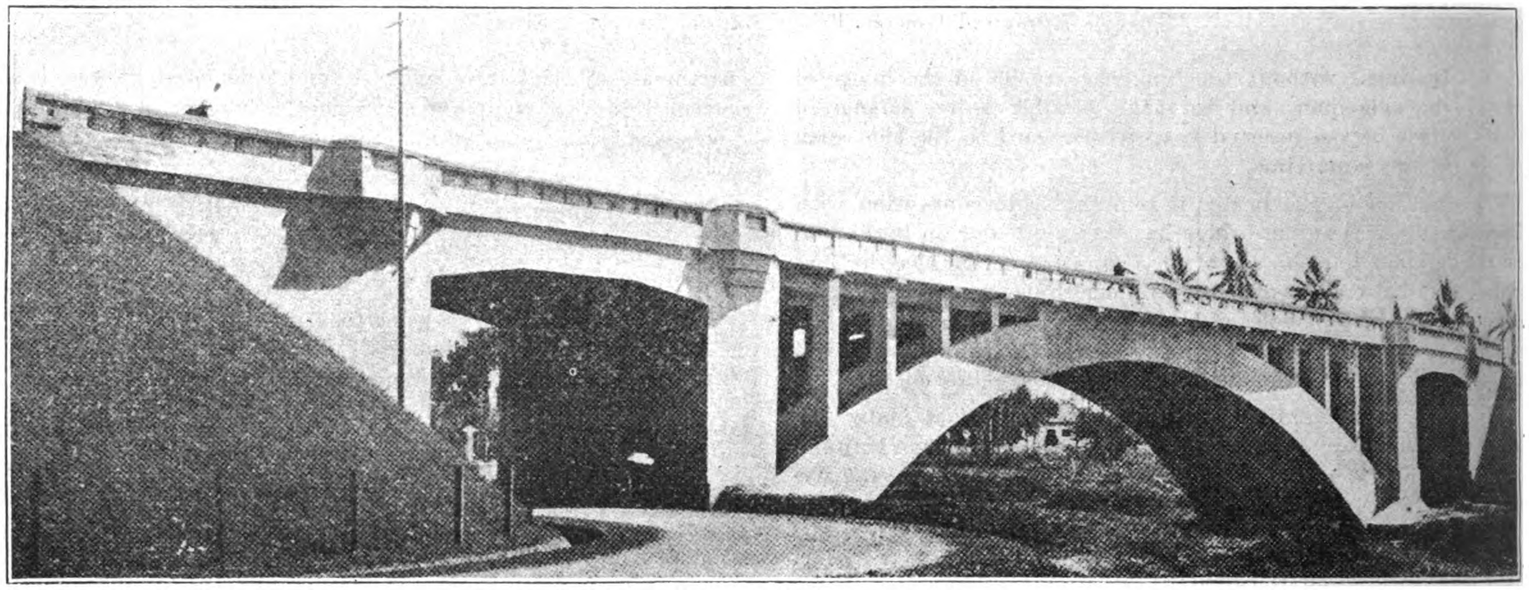
The gauge of the crane is the same as for the normal track of the state railways, namely 1,067 M., while the outer circumference of the crane remains within the profile of free space, so that the crane can wholly be conveyed along the straight open parts of the line. The maximum velocity is then 5 M. a minute, when conveyed along other parts of the line and over bridges and through tunnels the crane is taken apart into five pieces and the electric central-station is also dismantled.

The abutments are light constructions of reinforced concrete, upon which the main beams are resting.

The bridge is designed for the loading-specifications 1911 (see communication on the Serajoe bridge).

The Reinforced Concrete Railway-bridge Across the Ravine of the Kali-Belang in the Line Cheribon-Kroja

The bridge, planned and built by the "Dutch Company for works in reinforced concrete" was made in the war years 1915-1916, in connection with the difficulty to get steel bridges.



Reinforced Concrete Railway Viaduct, Java

The costs of the crane with the auxiliary implements were—erection included—*f* 33,000.

The time spent for the erection was for :

the Tjipamottan	5 months
the Tjipembokongan	5 months
the Tjikeboejoetan	3 months

On an average were erected two piers of 8 stages and two bridges in one month.

The costs amounted :

For the Tjipamottan with a weight of 689 tons, for buying to *f* 97,725, for erecting to *f* 27,000 for the Tjipembokongan with a weight of 644 tons, for buying to *f* 86,300, for erecting to *f* 27,000 for the Tjikeboejoetan with a weight of 310 tons, for buying to *f* 49,900, for erecting to *f* 14,000.

The Reinforced Concrete Bridge Across the Kali Proepoek in the Line Cheribon-Kroja

The girder bridge, in total 74 M. long, consisting of four spans of 12+14+14+12 M. was built as well as the bridge over the Kali-Belang in the years 1915-1916, of reinforced concrete in connection with the war condition.

The bridge contains about 430 M³ of reinforced concrete and was planned and built by the construction department of the Neth. East Indian state railways for the sum of *f* 44,000, inclusive the costs of supervision.

The cross-beams of reinforced concrete have been erected on piers of concrete, which have been reinforced in connection with the often appearing heavy "bandjirs" (floods.)

This is the first great railway-bridge made of this material, built for the state railways in Neth. East Indies.

The total length of the bridge is about 207 M. There are 23 spans of 9 M. on slender cross-beams of reinforced concrete of a height from 8 to 25 M. In the middle a dilatation joint is made with a cross-beam on either side. According to this the construction is divided into two continual layer-bridges of a length of ± 100 M.

The work contains, besides a quantity of 700 M³ of rubble-masonry, of 1,790 M³ of reinforced concrete, wherein 243 tons of reinforcing iron is used. The costs amounted to *f* 175,400.

The bridge is calculated according to the loading specifications of the state railways, fixed in 1911 (see communication about the Serajoe bridge.)

The Reinforced Concrete Railway-bridge over the Tjiliwoeng the Line Meester-Cornelis-Manggarai

The bridge arranged for double track—see Fig. 1—was planned by the construction department of the Neth. East Indian state railways in the years 1916-1917 and built under own management.

The total length is about 78 M. The middle part, spanning the Tjiliwoeng, is planned as arch bridge with a theoretical length of 38 M. and an arch height of 6.65 M. while the sidespans, 8 M. wide cover the streets.

The load for which the bridge has been designed, consists of two locomotives and an indefinite number of cars of the following scheme :—

The bridge contains about 2,400 M³ of reinforced concrete and 900 M³ of masonry in rubble and was built for nearly *f* 120,000.

The Chefoo Harbor Works

THE official opening of the Chefoo harbor works on 14th September, brings to a close one of the most interesting engineering projects for the improvement of an old Chinese open port. Opened to foreign trade in March 1862, the port of Chefoo was most unsafe, the anchorage being exposed to the prevailing winds and heavy storms, occasioning much loss to shipping and cargoes.

After 1900 the "Breakwater Scheme" was taken up seriously by the foreign chamber of commerce, and the Chefoo harbor improvement commission was formed in May 1913, consisting of the superintendent of customs as chairman, a representative of the consular body, the commissioner of customs *ex-officio* treasurer, and the chairman of the foreign and Chinese chambers of commerce. The breakwater surtax, to cover the cost of constructing the harbor works, was put into operation on 1st July, 1913, and expert advice called in. Arriving in October 1913, Mr. O. C. A. van Lidth de Jeude and Mr. B. van Exter, as assistant engineer, studied the harbor conditions and in April 1914 final plans for the improvement of the port were presented. In the same month these plans were finally submitted to the authorities in Peking, and duly approved in February 1915, when at the same time the raising of the necessary loan was authorized.

The project embraced the enclosing of a large area water (about 250 acres) by the construction of a breakwater and a mole.

The following works had to be made :—

(1) An eastern breakwater, 2,600 feet long, providing an entrance at either end, the northern entrance between the breakwater and the mole and one at the southeast corner between the breakwater and tower hill.

(2) A western mole, 5,873 feet long with a quaywall 600 feet long on the northern arm of it.

(3) Dredging of a great part of the shelter formed by the breakwater and mole to 20 feet below Chefoo zero, which means 22 feet at mean low water. An area of 900 feet by 450 feet near the breakwater to be dredged to 25 feet below C.Z.

On the 20th March, 1915, the C.H.I.C. asked for tenders for the loan and construction, either as separate or combined transactions. On the 1st June the covers were opened and out of four, the one from the Netherlands Harbor Works Company of Amsterdam was accepted for the sum of Hk. Tls. 2,677,000 (about Mex. 4,000,000) the cost of the breakwater being Hk. Tls. 1,157,079.-71, of the mole with quaywall, Hk. Tls. 1,352,553.18, of the dredging in the shelter Hk. Tls. 101,190.60 and of sundry expenses Hk. Tls. 66,176.51 (in consequence of the typhoon of August 1917 some modifications in the construction of the mole were agreed upon, towards which the C.H.I.C. paid Hk. Tls. 110,000.00. Some additional dredging works at the approaches to the harbor cost another Hk. Tls. 55,000.00).

As no offer for the loan was received, an arrangement was made with the Russo-Asiatic Bank for an overdraft, guaranteed by the revenues of the surtax. Beginning with April 1918 the commission received a loan from the surplus of the customs revenue, to be repaid with the entire proceeds of the surtax until finally redeemed. On the 9th June, 1915, the contract for works was signed and actual work started in August. According to the contract the works had to be carried out in four years but in consequence of the typhoon in August 1917 and modifications of the plans the time for the completion was extended by eighteen months. In September 1915 Mr. C. Rickard was appointed engineer-in-chief.

BREAKWATER.—The type of the breakwater is that of a rubble foundation with a superstructure wall, the lower part being constructed of blocks in masonry set in regular order and the upper part of monoliths in masonry built *in situ*. The total height between the base of the foundation mound and the top of the parapet of the breakwater is 51½ feet. The width of base of foundation mound ranges from 117 feet to 133 feet.

The principal dimensions and levels for the breakwater are :

Total length: 2,600 feet, level of top of foundation: 20 feet below Chefoo zero (Chefoo zero is about 1.8 feet below mean low water); level of top of breakwater (without parapet): 18 feet above C.Z. ; level of top of parapet : 21½ feet above C.Z. ; width at top of blocks : 30 feet ; width at top : 26 feet ; width of parapet at base : 7 feet ; width of parapet at top : 6 feet.

The two circular heads of the breakwater are formed for the lower part by reinforced concrete caissons each 50 feet long, 40 feet wide and 25 feet high, and the upper part by monoliths of masonry work. The large breakwater blocks were set by divers to a slope of 75 degrees with the horizon, in three rows built up of blocks, of 32 and 24 tons each. Upon the outer berm of the rubble mound, where the exposure to wave action is greatest, blocks of masonry weighing 3 tons each were placed in regular rows to protect the rubble mound at the foot of the upright work. All the blocks were built in the blockyard at the West Beach, transported on trucks to a block loading jetty and loaded on to iron lighters. Floating cranes were used for depositing the breakwater and berm blocks. The caissons were built on a slipway and launched. When completed afloat they contained each 250 cubic yards of reinforced concrete and drew from 10½ to 11½ feet. Stairs were made and ladders affixed on the inner face of the breakwater. Two light towers have been erected on the heads.

MOLE WITH QUAYWALL.—The mole, which is connected with the shore, consists for the lower part of a mound of sand covered by brushwood constructions known as "zinkstuks" and ballasted by rubble. The above low water work is constructed in rubble. The superstructure is surmounted by a parapet of masonry. Upon the crown a macadam road and railway track were laid.

The Quaywall on the northern arm is constructed in a similar way as the breakwater of blocks in masonry, with a backing of rubble. Each end of the quaywall is formed by a caisson of reinforced concrete containing 167½ cubic yards reinforced concrete. Fenders, ladders and bollards have been provided. A light tower upon the end of the mole has been placed.

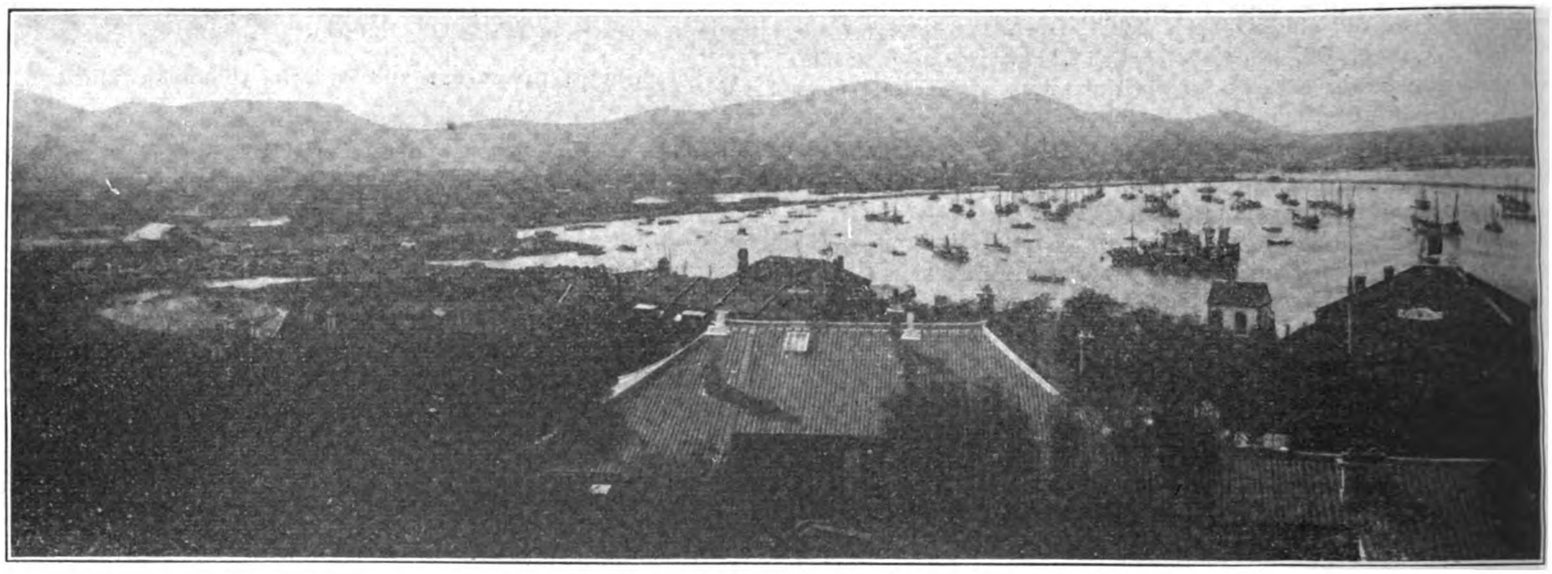
DREDGING WORK.—Before the rubble mounds of the breakwater and quaywall were tipped and the sand dumped for the foundation mound of the mole, channels were dredged in the harbor bottom which were filled up with coarse sand. The excavated material was delivered into self-discharging hopper barges and dumped out in the open sea. An area of about 100 acres of the shelter has been dredged for the greatest part to 20 feet below C.Z. and for a small part to 25 feet below C.Z. Both approaches to the harbor are being deepened to 20 feet below C.Z.

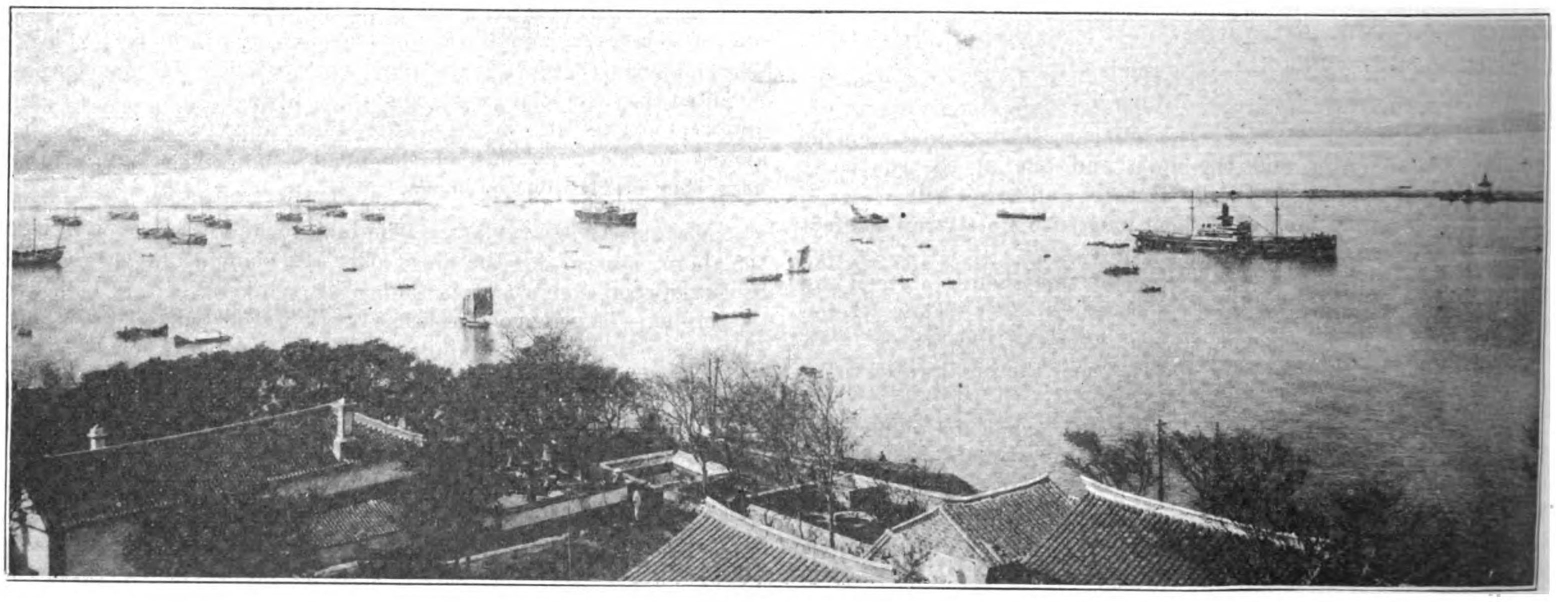
GENERAL.—The contractor employed from 15 to 20 foreign civil engineers, overseers, etc. Besides some Chinese engineers and in the height of the working season from 1,000 to 1,200 Chinese laborers. In the stone quarries about 500 stonebreakers and coolies were generally employed. Fifteen Japanese and Chinese helmet divers were engaged on the work. A suitable site for workyards, living houses, workshops, godowns, sheds, etc., was chosen on the West Beach. At the Bluff depôt, a distance of three to four miles from Chefoo, the stone quarries were situated and also the slipway for the construction of the caissons, houses for overseers, godowns for explosives, etc.

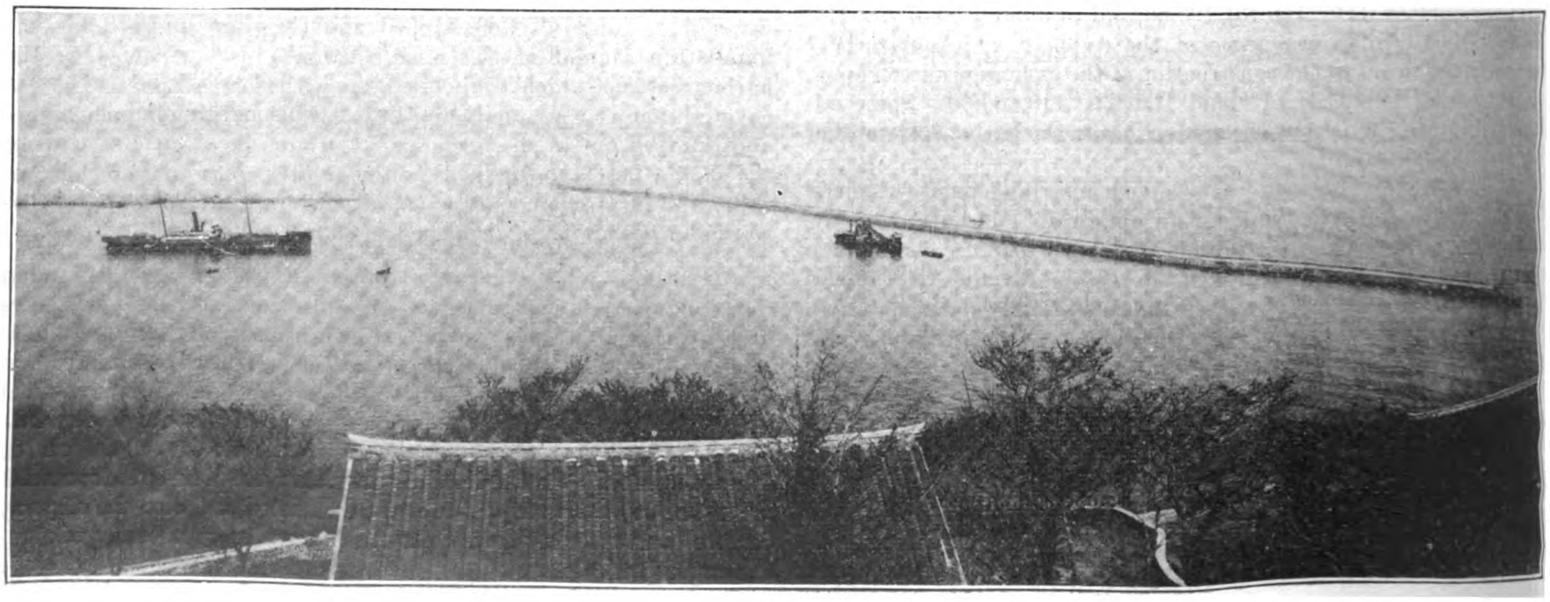
A complete compressed air rock-drilling plant was installed during the construction period in order to increase the output of the quarries. The following plant was used by the contractor:—

One 35-ton overhead traveling steam crane for lifting the large blocks on to the trolleys ; one 35-ton steam crane on jetty for loading these blocks on to the lighters ; one overhead traveling crane

PANORAMIC VIEW OF CHEFOO HARBOR WORKS







for lifting 3 tons berm blocks on to the trucks; one derrick crane for loading these blocks on to the lighters; five derrick cranes on the breakwater for handling materials; one bucket dredger; one suction and pumping dredger with pipeline; six hopper barges; Four sea-going steam tugs; one motor-tug; three motorboats; two 35-ton steam floating cranes for setting the breakwater blocks; one steam piledriver and centrifugal pump on an iron pontoon for depositing berm blocks and pumping jobs; five iron lighters for the transportation of blocks; one iron lighter for the transportation of cement; ten wooden lighters; 62 stoneboats and junks; a great number of sampans and rowboats. Moreover, there were all the usual contractor's transportation plant, equipment, spare parts, etc. All the repairwork to the plant and constructing of new gear was done in the contractor's own repair shops.

A total of about 275,000 cubic yards has been dredged to form a channel under the breakwater to receive the rubble mound. In total 153,000 tons of stones have been dumped in the breakwater foundations. In all 4,010 large breakwater blocks have been set, containing 63,500 cubic yards of masonry work. 3,300 three tons berm blocks, containing 5,900 cubic yards of masonry, have been placed on the eastern berm of the breakwater. The superstructure of the breakwater consists of 41,000 cubic yards of masonry work. Before the foundation mounds of the mole and quaywall were dumped 160,000 cubic yards were dredged to form channels in the mud bottom, underneath these constructions, which were filled up with sand. In the under-water work of the mole 1,215,000 cubic yards of sand have been dumped.

A total of 54,400 square yards of brushwood "zinkstuks" with 1½ feet filling and 88,800 square yards with 1 foot filling have been sunk in position. On these "zinkstuks" 66,500 tons of heavy rubble and 20,000 cubic yards of sand have been deposited. The superstructure of the mole contains 392,700 tons of rubble of various grades and the parapet 5,300 cubic yards of masonry work. In all 675 large blocks have been set in the quaywall and wing-walls, containing 9,700 cubic yards of masonry work. The superstructure of the quaywall consists of 3,550 cubic yards masonry work. To deepen the harbor and approaches 650,000 cubic yards of soil were dredged. The whole of the mass of quarried stone 852,000 tons, besides 35,000 tons of broken stone and gravel has been conveyed to the site of the works junk-load by junk-load and deposited according to its size in the various sections of the breakwater, mole and quaywall. In total the dredger excavated 2,300,000 cubic yards of material for the construction of the works. Roughly 106,000 casks of cement have been used. In all 2,000,000 bundles of brushwood were supplied from Ningpo and Antung and used for the construction of "zinkstuks." The dredgers and tugs consumed 24,000 tons of coal during the construction period. In all 21½ tons dynamite and 13½ tons of black powder have been used to produce the quarried stone. The whole of the work on the breakwater was finished on the 13th November, 1920, and that of the mole and quaywall will be completed by the end of this year.

Japan Expanding Candy Industry

AMONG the Western customs adopted by Oriental peoples, most of all by the Japanese, is the toothsome one of candy eating. Everything from caramles to milk chocolate is consumed in large quantities, and Japanese manufacturers plan to introduce ice-cream and chewing gum made in Japan.

Hanzaburo Matsuzaki, managing director of one of the largest candy-making concerns in Japan, the Morinaga Confectionery, has compiled the following brief history of the industry from the reign of Jin-mu Tenno, the first emperor of Japan:—

"The making of cakes or confectionery had been started in Japan previous to the reign of Jin-mu Tenno, the first emperor. When he celebrated his victorious campaign at Mount Takakura he ordered made some 'mizuame,' a sort of sweet jelly made with millet. The term 'kwashi,' which in English means confectionery or sweetmeat, was coined in the reign of Emperor Suijin. The stuff was made of fruits, but as time went on syrups were introduced, which mixed with rice or wheat flour made a sort of paste cake. The confectionery business developed rapidly in the luxurious mode of life of the Tokugawa Shogunate. Cakes were originally used only as feast offerings to deities, but came to be eaten at formal teas. In the latter days of the Tokugawas white sugar was introduced from Holland, and the Dutch in Nagasaki taught the Japanese how to make sponge cakes and to use sugar for various sorts of cakes.

"All this was done by hand up to 1898, when the Oriental Confectionery Co. was established in Tokyo, aided by foreign experts and imported machinery. There was much popular opposition to these cakes of foreign origin, and those engaged in making them were regarded with hatred and harassed in every possible way, but this feeling has more recently been overcome.

"Confectionery in Japan has come to be regarded as a food. The consumption of sugar amounts to about 600,000,000 pounds per year, of which confectioners use about 360,000,000, or some 60 per cent. This industry has become one of the most important in Japan. Confectionery is consumed by all classes of men, from the paupers to the rich, or offered on the shrines of deities.

"The problem of men and money which has confronted this industry is now being solved. A total capital of Y.27,000,000 is invested in thirty different companies. Another problem is that of drying arrangements, for in Japan the humidity and climatic changes make special machinery necessary, unlike America, where the drying is done by nature. The hardening of chocolate is one of the things we are now working on, with experiments in various kinds of refrigeration."

"Japanese manufacturers pay 5½ and 6 cents for their sugar."

"Our markets are in China, India, Java and the South Sea Islands. My visit to America is to buy machinery for our eight factories in Japan, and I am going to England, France, Germany and other countries for the same purpose, accompanied by three experts from our own plants."

Domestic consumption of confectionery by the 70,000,000 people of Japan amounts to Y.350,000,000 a year, according to Mr. Matsuzaki, and probably will increase to Y.700,000,000, or Y.10 per capita. Much of the candy is used as offerings to local Buddhas and other deities. The Morinaga Confectionery Company makes candies, biscuits, chocolate and cocoa, condensed and dried milks, but Mr. Matsuzaki plans to enter the manufacture of chewing gum and ice-cream, both of which are popular in Japan.

Singapore Municipal Budget

The estimated revenue is $9,710,000 an increase of about $700,000 on this year's revenue, $600,000 of which is from the rates.

The estimated expenditure is $9,723,146, a near enough balancing.

Three loan programs are drawn up. The first assumes that a loan of 12 millions will be raised, the second 5½ millions, the third no loan. On each of these a plan of works is based. The first plan includes such large works as half a million on roads and bridges, a quarter of a million on roadside drainage, new incinerator unit, Municipal workshop improvement, land garage and driver's quarters at Mackenzie-road, and a million on housing; also $372,000 on new markets; $3,385,000 for electricity, of which three millions is for the tramways and lighting; and five millions on water.

The second scheme, if the five million loan is carried through, still includes the chief waterworks, but not the tramways acquisition, cuts down the extension works in all departments, and brings down the expenditure on loan account to $7,391,750.

The third, or barebones scheme, anticipates no works on loan account.

The estimated expenditure on interest and sinking funds amounts to $1,360,000, roughly speaking one-seventh of the revenue.

Japan's Motor Industry

By Verne Dyson

SEVERAL weeks ago in Yokohama I was one of a crowd of several hundred which watched with considerable curiosity the ponderous movement of a huge, mysterious, coffin-shaped box through the streets. The long crate lay across the top of two trucks and there were about fifty coolies in attendance.

The monster carton was a tight fit in the narrow streets which led away from the water-front. When it went into a street it plugged it up tight. Corners were negotiated with supreme effort. Frail Japanese dwellings were in danger of being crushed. The whole performance was marked with solemnity and the deepest concern. I followed the cortege until it came to the back entrance of a garage. The great box held the precious form of a Rolls-Royce.

"You see the Japanese are buying the best there is in motor cars," explained Mr. F. T. Bennett, manager for Sale & Frazar. "This car, of course, is for a very wealthy man; in fact one of the nobility, but it is characteristic of the Japanese to be satisfied with nothing short of the best of everything when they can afford it.

After Mr. Bennett had seen the crated car lowered safely to the cement floor, he gave me a personally conducted tour through the plant of one of the two largest motor concerns in the Japanese empire. The other is the Naigai Kogyo Kaisha, Ltd., of Tokyo, of which I will speak presently.

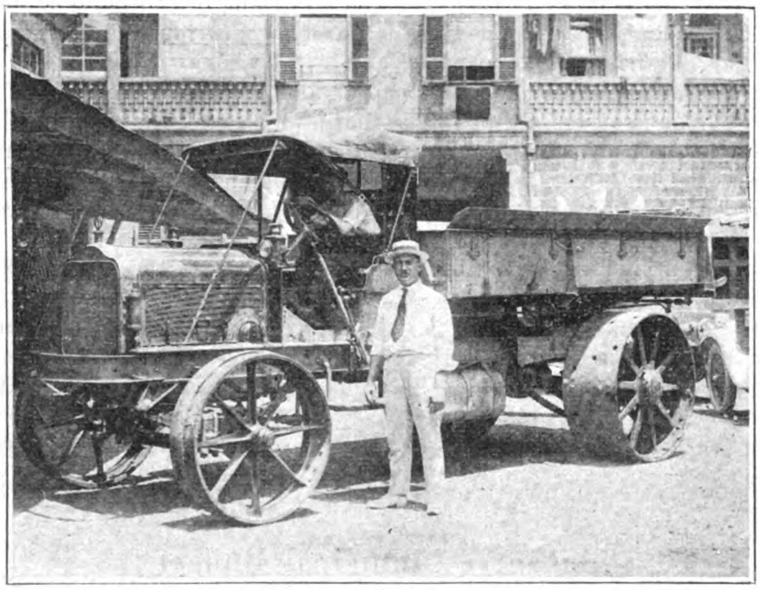
We went first to a stock room. Mr. Bennett explained with a sweeping gesture, "You see eight hundred thousand yens' worth of material in here, and now we will go to another stock room where there is four hundred thousand yens' worth."

In the body-building plant we found about one hundred Ford bodies in the process of making. At present the plant is turning out Ford bodies at the rate of seventy-five to one hundred per day. Sale & Frazar's assembly plant, Mr. Bennett explained, is the oldest institution of its kind in Japan. It was here many years ago that the first motor cars seen in Japan were put together.

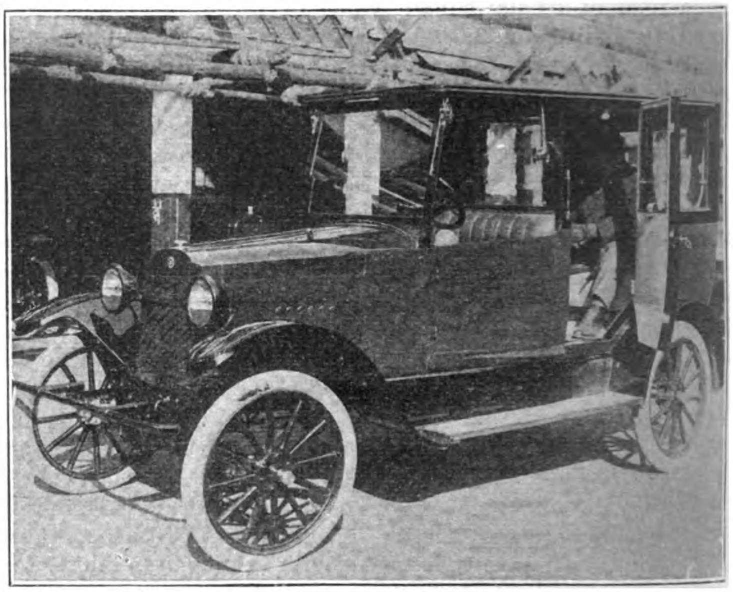
Aside from Rolls-Royces ad Fords, the concern distributes the Franklin, Hupmobile, Armstrong Siddeley and the White truck. The company has branches in seven large Japanese centres and in Korea and Taiwan. The plant in Yokohama sells approximately one thousand gallons of petrol daily.

Mr. Bennett is a fat-man American, good-natured and keen and fond of the Japanese. I think his marked success as a salesman comes very largely from his liking for the people with whom he deals. Prejudice to a great extent discounts the efficiency of a salesman, and it would be a splendid policy for foreign firms operating in Japan to transfer or dismiss all representatives who profess hatred for the Japanese. In Japan as everywhere, the element of friendship is a strong factor in successful salesmanship.

"Frankly, I rather deal with the Japanese than foreigners," declared Mr. Bennett. "I find the natives more appreciative—easier to satisfy in every way. Too often a foreigner who buys a car becomes a nagger."



The Largest Truck in Japan. It is a White Five-ton, Owned by the City of Tokyo



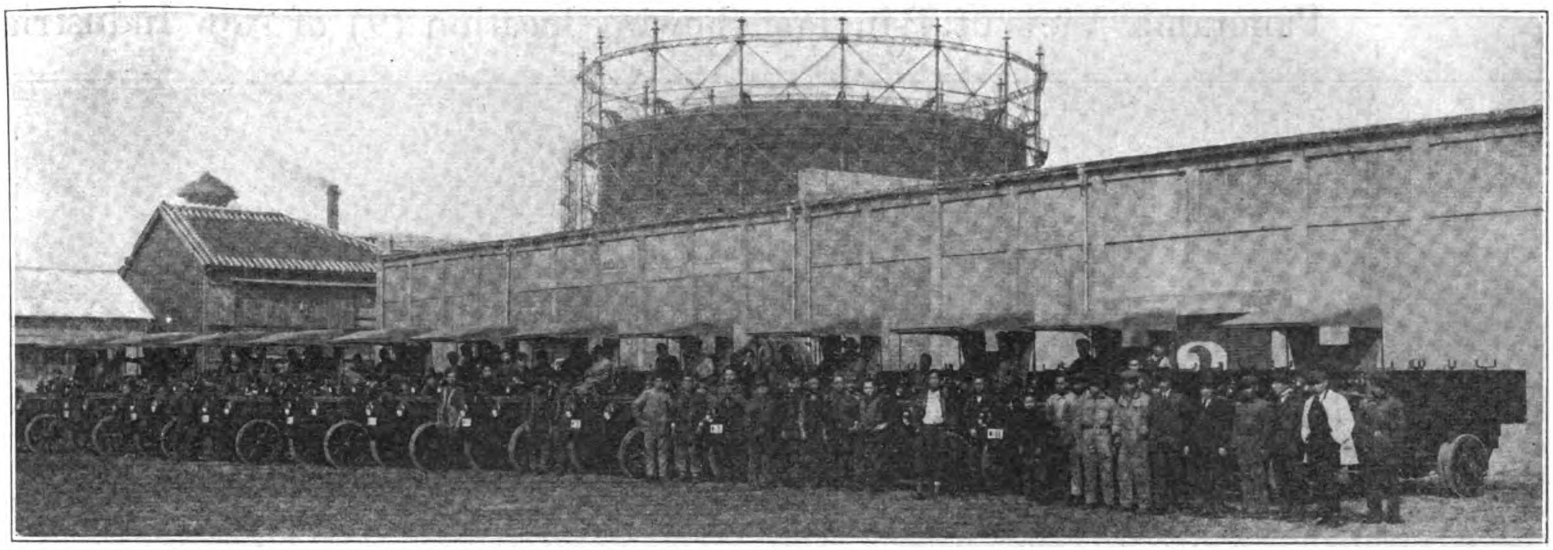
The Favorite Type of Limousine Body which the Japanese Build on the Ford Chassis. There are Twenty of these Cars in Yokohama and 150 in all Japan. The Cost is Y.1,400 more than a Stock Ford Touring Car

In reply to some general questions about Japanese motorists, Mr. Bennett said:

"The people in the Japanese cities thoroughly detest motorists. I fancy this condition comes from the fact that there are no sidewalks and that in the past the pedestrian regarded the street—all the street—as his domain. Consequently, in the cities the motor car is regarded as an encroachment.

"In the country, however, the reverse is true. Japanese farmers are friendly to motorists and in case of trouble will give their assistance without charge.

"The motorist in Japan frequently notices that in passing children they will throw up their arms and shout, 'Banzai'. I am informed that in the schools the children are taught to accompany the 'Banzai' with gestures, since this act discourages the inborn tendency of a small boy to reach down and pick up a stone and hurl it at a passing vehicle. The stone-throwing habit is dis-



Twelve Packard Trucks Purchased Recently by the Japanese Army. The Machines are Lined Up in Front of the Godown of the Naigai Kogyo Kaisha, Ltd., in Tokyo

couraged for the reason that some day the emperor might be passing in a motor car."

A visitor to the capital city of Tokyo finds the Packard conspicuous in its various forms of limousine, open touring car, truck, bus and street sprinkler. The Packard is the car of the moment in the official and higher social circles in Japan, due largely, I fancy, to the aggressive methods of the large native distributing firm of Naigai Kogyo Kaisha, Ltd. (International Industrial Company, Ltd.) which has its head office in Tokyo.

When you arrive at the Tokyo central railway station you note a large red Packard motorbus in waiting. It is one of two which are used by the Mitsukoshi Company, Japan's largest department store, in transporting customers between the station and the emporium.

The Mitsukoshi bus is mounted on a one and one-half ton truck chassis. The wooden body has a red lacquer finish with the trademark of the firm painted on either side. The two bodies were made in the large modern body-building plant of the Naigai Kogyo Kaisha, Ltd.

Packard twin-six limousines or touring cars are owned by these prominent people in Japan: Baron H. Mitsui, head of the great world-wide Mitsui business organization; Mr. T. Nakahashi, minister of education, and for many years president of the Osaka Shosen Kaisha, one of the three largest Jagnese steamship companies; Mr. S. Wakao, member of the house of representatives and a well-known business man and politician; Mr. H. Gurney, councillor to the British embassy; and by the Tokyo office of the Yokohama Specie Bank.

There are approximately one thousand motor trucks in Japan and of this number about 16 per cent. are Packards. The Japanese army and navy own sixty Packard trucks. The aviation corps of the army recently purchased twelve trucks in one lot.

"Among Packard owners in Japan, the Japanese army stands first," Mr. G. Satow, foreign manager for thé Naigai Kogyo Kaisha, Ltd., informed me last week in Tokyo, "and, of course, what the army uses principally is trucks, but there is an increasing demand for Packard commercial vehicles in various industries and different lines of business.

"At present the principal feature of a motor truck that impresses a business man is its high price. Not enough consideration is given to the other features of safety, saving of time, ultimate saving and general efficiency. The tendency is to hold on to old methods of transportation even when they are shown to be the most costly.

"Another enemy of the truck in Japan is bad roads which considerably shortens the life of a motor car. Modern business methods, however, call for up-to-date transportation facilities, and good roads must be provided.

"Most of the trucks operating in Japan are from one to two and one-half tons capacity; there are very few heavier trucks. As a matter of fact, the operation of heavy trucks is prohibited by police law because of the weak bridges and other bad road conditions. Roads are being improved and these obstacles gradually removed. Only the army is permitted to possess heavy trucks.

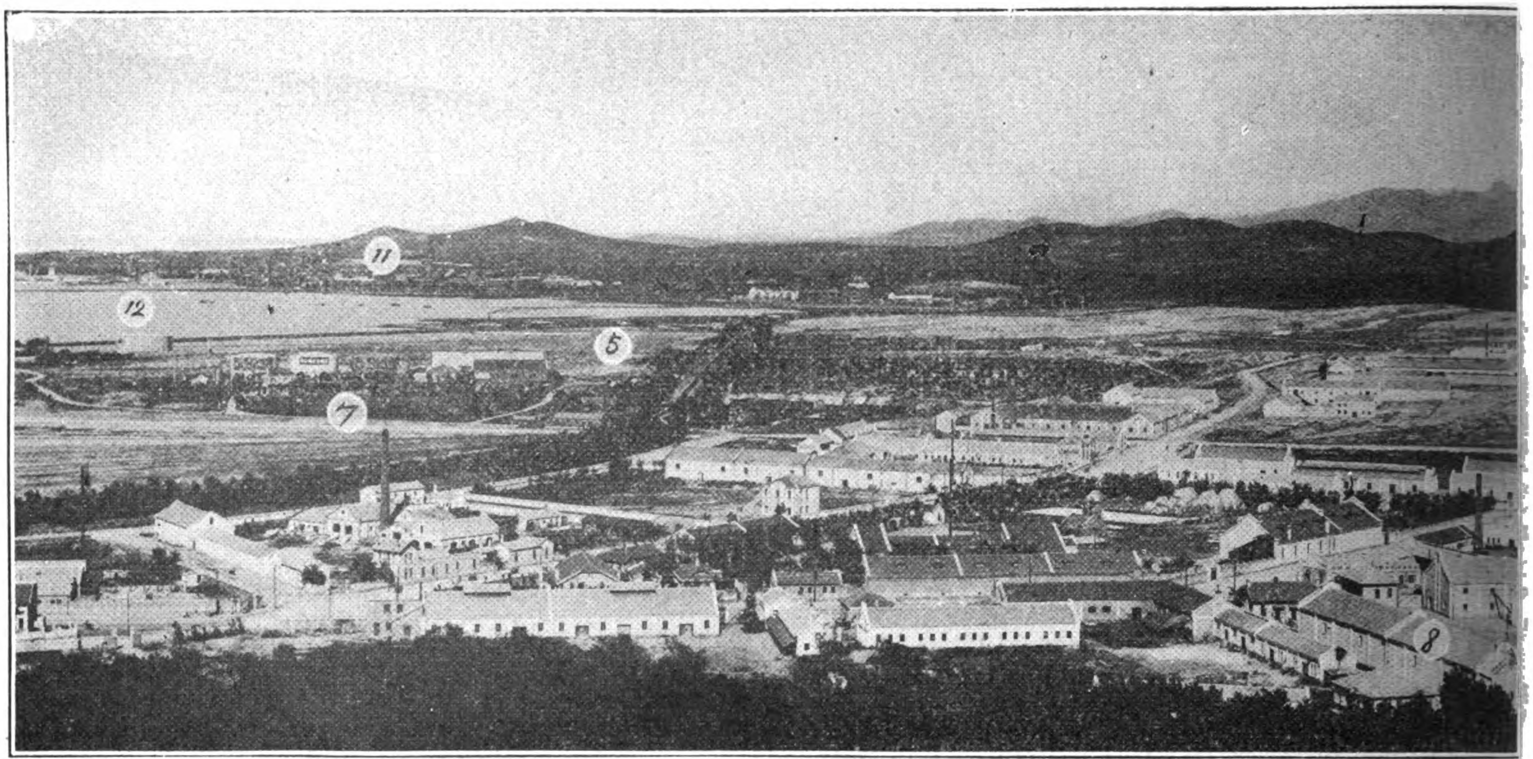
"Packard sprinklers, purchased by the municipal government of Tokyo, were the first machines of this type to operate in Japan. Because of the bad condition of the streets in Tokyo, sprinkling is most important. Formerly the wide streets of the capital were sprinkled by small man-pulled carts. One can easily imagine the cost and inconvenience of this method.

"When the officials of the city decided to employ motor truck sprinklers in 1919, His Majesty, the emperor, was so pleased with the idea that he contributed Tls. 50,000 toward the cost. At present there are a number of Packard and other truck sprinklers in Tokyo. Following the example of this city, Yokohama purchased two Packard street sprinklers last year. As in other kinds of service, the Packard sprinklers are giving most satisfactory service both in Tokyo and Yokohama.

The Private Fire Department at the Sale & Frazer Motor Car Plant in Yokohama

"Two Packard dumping trucks are owned by the electric bureau of the municipality of Tokyo, which controls both the tram car service and the electric lighting system. They are used in the transportation of sand and gravel. The prefectural government of Tokyo also has purchased several Packard dumping trucks."

Panoramic View of Tsingtao, showing location (9) of New Industrial



(7) Tank Installation of the Asiatic Petroleum Company. (5) Reclaimed Area. (11) The Town of Syfang, location of the Shantung Railway Shops. (12) Future Reclamation Project. (8) Factory District

A 60-Ton Self-Propelling Floating Crane

DURING May last, a 60-ton self-propelling floating crane was delivered by the Werf Gusto, Firma A. F. Smulders, of Schiedam, Holland, to the Manchester Ship Canal Company. The crane is of the firm's "Gusto" slowing and derricking type, and is provided with two blocks, one capable of working with loads up to 60 tons, and the other up to 10 tons, both arranged so that the crane can deposit heavy loads on its own pontoon. The loads are counterbalanced by two traveling ballast weights, the effect of which can be varied by traversing them horizontally, so that by their means the pontoon which carries the crane will remain practically level athwartships while lifting all loads up to 60 tons.

The crane rests on a tower built in the pontoon. The former is secured to the sides as well as to the bottom of the latter. This tower is of conical shape, and is provided with a bearing at the top. The main parts of the crane consist of the revolving framework and the jib. The framework is composed of an upper platform, which rests on the top bearing, a lower platform, on which the centre rollers of the tower and traveling counterweights are fitted, and the connecting structure between the two platforms.

The maximum height of the hooks, both for the main and the auxiliary hoist, is 65-ft. from water level at lowest position of the jib. The hoisting ranges are 75-ft. and 120-ft. respectively. The maximum radii of the hooks are 60-ft. and 76-ft. respectively, which correspond with a distance of 32½-ft. and 47½-ft. respectively clear of the pontoon. The jib can be lowered so that its highest point is not more than 73-ft. above the water line. The hoisting speeds for the 60- and 10-ton loads are 7-ft. and 40-ft. per minute respectively. A complete revolution with the full load of 60 tons was made at the trials in about 2 min.

The cabin in which the machinery for effecting the various movements of the crane is placed is situated on the lower platform. At the back of it and between the upper and lower platforms are two vertical screw spindles for raising and lowering the jib. A counterweight moved with these shafts between vertical guides serves partly to balance the weight of the jib. The latter is connected to the framework by means of two horizontal pins at the front of the upper platform and to the movable counterweight on the vertical screw spindles by two tie-bars. By means of these tie-bars the jib can be derricked from its lowest position to its highest position.

All the movements of the crane are effected by electric motors, of which there are seven in all. The power is transmitted from the motors by worm and spur gearing with machine-cut teeth. Electrical brakes are fitted to all the motor shafts. The various movements are controlled from a cabin placed on the top of the crane framework. The driver, having a clear view not only of the load, but also of the deck of the pontoon, is able to observe the movements of weight he is dealing with. In front of him are the controllers with which he can control any of the motors as required. All the controlling apparatus is arranged close together so that the driver can make any required movement without altering his position. In the cabin are also placed the necessary switches, measuring instruments and resistances for the electrical equipment, the apparatus for controlling the inclination of the vessel, and an indicator on which the position of the jib can be seen at any moment as well as the distance of the hooks from the centre of tower. There are telephones between the controlling and machinery cabins, and speaking tubes between the former and the deck and machinery cabin. There is a special emergency switch for use in the event of it being necessary to stop any operation instantaneously.

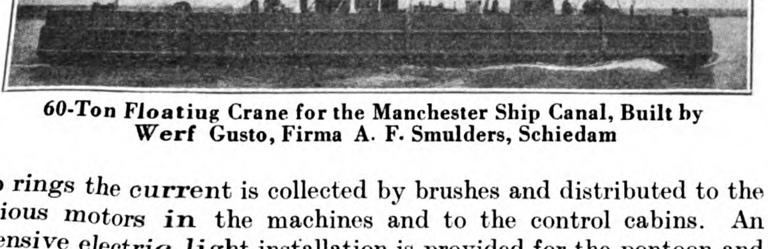
The builders explain that only one man is required in the control cabin for working the crane, this simplicity of handling being made possible by connecting up the electrical installation in accordance with the Ward Leonard system. For the system, as applied in the present instance, it is claimed that (*a*) any load can be hoisted or lowered at extremely low speeds, which is of the utmost importance when handling heavy weights, erecting, etc. ; (*b*) that any weight can be moved at varying speeds without any change being made in the mechanical transmission ; (*c*) only weak currents are controlled, so that wear and tear of contacts is reduced to a minimum, and there is practically no loss of energy ;

Town, now being laid with Streets, Sewers and Waterpipes

(8) Factory District. (9) Area for New Factories. (10) The Chinese City of Taitungchen

(*d*) the starting of the motors is accomplished without placing any undue stresses on the crane structure or the transmission gear; and (*e*) owing to the small number of controllers, switches, etc., maintenance charges are low. Wherever possible, safety devices, such as switches for limiting the working range of each movement, have been fitted. Emergency switches, electrical brakes and an automatic cut-out for guarding against too heavy currents, are also provided.

The current for actuating the motors is supplied by dynamos which, together with their switchboard, are placed in the pontoon. These dynamos are driven by one of the compound propelling engines. The cables conveying the current pass from the dynamos to the interior of the crane tower, and are connected to the slip rings on the outside of the upper end of the tower. From these



60-Ton Floatiug Crane for the Manchester Ship Canal, Built by Werf Gusto, Firma A. F. Smulders, Schiedam

slip rings the current is collected by brushes and distributed to the various motors in the machines and to the control cabins. An extensive electric light installation is provided for the pontoon and the crane. By means of a clutch the engine previously mentioned can be coupled to the propeller shaft. The machinery for propulsion consists of two sets of vertical compound engines with an independent surface condensing plant. At the trial trip on the river Meuse an average speed of 5½ knots per hour was attained. Between the two engine-rooms is placed the boiler which is designed for a working pressure of 150-lb. per square inch. The deck machinery includes two windlasses, hand steering gear, bollards, engine-room telegraph gear, etc.

The deck aft in the path of the radius of action of the crane is free of all obstacles and is especially strengthened so that any heavy weight may be placed on it. Cabins for the officers and crew, gallon, lamp room, lavatories, also coal bunkers, water tanks, store rooms, etc., are built on deck or in the pontoon. Only three men are required for operating the crane, viz, engine driver, deck hand and crane driver.

Tsingtao's New Industrial Town

Notwithstanding the difficulties surrounding the transfer of Tsingtau to the Chinese government, as long as it remains under control of the Japanese, they apparently intend to carry out the improvements already planned, and to this end recently started work on the new industrial section of the port located close to the harbor and railway.

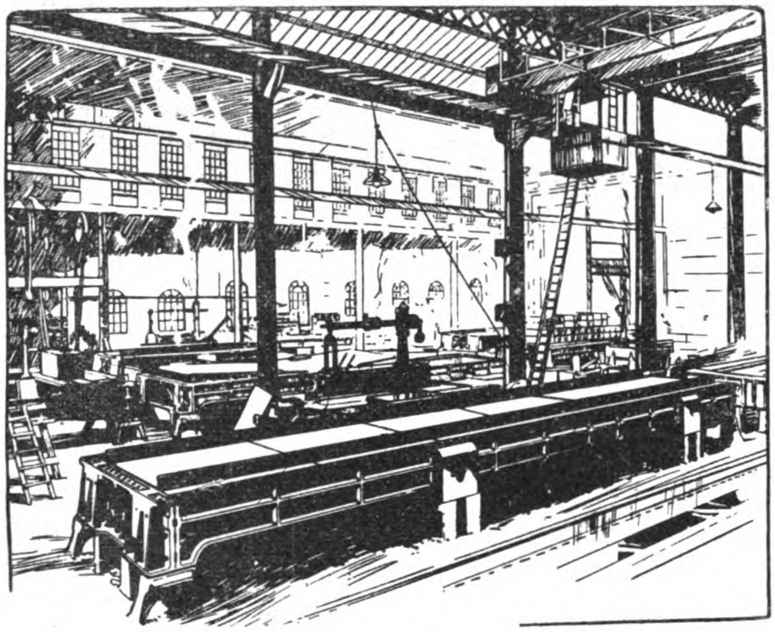
The work, which was let to the lowest bidder at public tender, calls for:

1. Surfacing, 158,000 *tsubo* (including surfacing of roads)
2. New roads; 72 feet wide and 2,180 feet in length
3. New roads; 48 feet wide and 18,894 feet in length
4. Drain pipes; 39,304 feet in length
5. Water pipes; 10,404 feet in length.

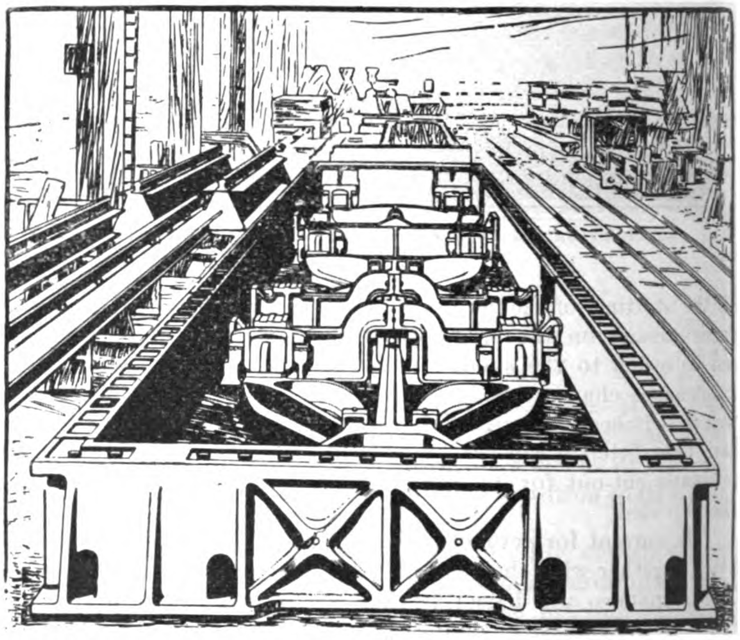
The contract was obtained at a bid of Y.146,000 on the part of the To-Kwo Company (Tung Hwa Kung Ssu), a Japanese-Italian combination, organized by Mr. T. Kaidsuka and Major Garibaldi, the latter acting as managing director. Work was commenced on July 11th last, and is expected to be completed in September 1922. The present contract, when completed, will open up a new business and industrial section located in close proximity to the transportation centres, and the authorities are apparently sparing no reasonable expense to make this district a fitting complement to the residential section created by the Germans.

Weighbridges for Use on Chinese Railway Systems

GREAT strides are being made by the engineers who are responsible for the maintenance and efficiency of the important railway systems of China, and they appear to be making every effort to bring the systems quite up-to-date by the introduction of the most modern plant and appliances. At the same time great care and discrimination are employed with the object of introducing only those machines and appliances, which, by actual test, and owing to the reputation of the manufacturers responsible for their production, are certain to be efficient, and to give good results in service. The policy of the engineers is no doubt to eliminate, as far as that can be done, the risk of failure of any part of their plant or machinery. In order to carry out that policy the engineers must have confidence in the efficiency, not only of those engineering products which are perfected under their own supervision, and which are manufactured in accordance with their own designs, but also of the machinery of a special nature which is manufactured for them to designs put forward by the makers, and "backed" by the reputation of those makers, and the experience and knowledge of their own engineers who are specialists in the particular class of machine which they manufacture.



Combination Weighbridge Designed for a Chinese Railway being erected



View showing Details of the Levers, Knife Edges, etc., Designed for use on a Chinese Railway

A very good example which bears out this supposition of ours is to be found in the large railway weighbridge of to-day. Messrs. Henry Pooley & Son, Ltd., of Birmingham, England, have a world-wide name as the manufacturers of weighbridges which embody every possible improvement, and which can be regarded always as the product of highly skilled and experienced weighing machine engineers for the use of equally skilled and experienced railway engineers.

The machines produced by that well-known house can be relied upon always to give satisfaction whatever the conditions of service, as they are in every case designed to efficiently meet the special and varying conditions of the different countries, climates, etc., with which engineers must always contend. They have had a unique experience of railway conditions during the eighty-five odd years during which they have manufactured weighing machines for all the chief railway companies of Great Britain and many overseas countries ; and their engineers have not failed to take full advantage of the vast experience gained during that time. These facts, and also the striking fact that nine-tenths of the railway traffic of Great Britain and Ireland is weighed on Pooley weighing machines no doubt influenced the engineers of a number of the railway companies in China, with the result that Messrs. Henry Pooley & Son, Ltd. are now shipping out a number of weighbridges of a special design for use on their systems. The machines are all of the same design and consist of two weighing units, the length of which is so calculated that every wagon of a freight train composed of mixed wagons varying from the small fixed frame wagon of 12 tons capacity, with a wheelbase of 9 feet, to a large 40-ton bogie wagon with a wheelbase of 35 feet, can be weighed as it passes over the weighbridge, without the necessity of uncoupling. An enormous saving of time is thereby effected. The machines are designed to withstand the passage of a locomotive imposing a load of 60 tons on a wheelbase of 12 feet, and as all the parts are of ample strength to withstand that rolling load, no relieving apparatus of any description is required.

The indicating steelyard is graduated up to the metric equivalent of 70 tons, and in this connection it will be noted with interest that the Chinese railway companies are now using the metric system of weight only—the machines being arranged to indicate by divisions of 5 kilos, up to 70,000 kilog.

The two photographs which accompany this short article represent one of the machines during construction at Messrs. Pooley's Works at Kidsgrove, in North Staffs., England, and the arrangement of the weighing levers, the ample strength of the parts, and length of the knife-edge centres, can be clearly seen.

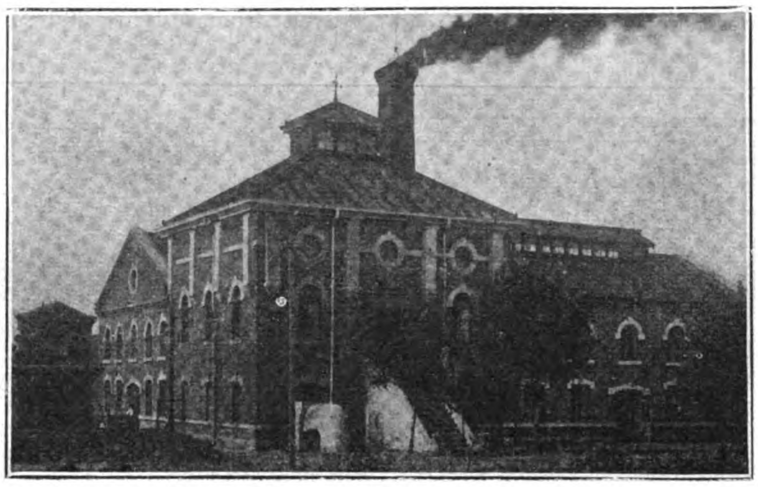
The Dairen Waterworks

The Present and Future of a Model Establishment

BY DR. Y. KURATSUKA

Continued from October

THE temperature in Dairen district varies from about 30° C. (the highest in summer) to 15° below zero C. (the lowest in winter), the range between both extremes being 45° C. Therefore, it is probable that even a massive structure as the dam will expand or contract and will cause temperature cracks, and this phenomenon will be more remarkable than in the mild climate as in Japan.



View of Main Pumping Station at Shahokou

Such temperature cracks are only natural phenomena and arequite impossible to be avoided.

However, in a district such as about Dairen, which has excessive heat and cold, it was deemed necessary to make some suitable provision. Therefore, the contraction joints are provided, the first undertaking in Japanese masonry dams. Such joints number five in the principal part of the dam besides two more in the overflow portion, totaling seven. The distance between any two successive joints is about 90-ft. By means of these joints, the body of the dam is absolutely divided vertically. The contact surfaces of each joint have a thin coat of asphalt, laid thereon, so as to prevent adhesion, thereby giving no resistance to expansion and contraction. Then, a couple of copper strips are kept inserted across the contact surfaces of each joint along the longitudinal axis of the dam, or at a certain angle thereto, to cut off the leakage of water through the joints.

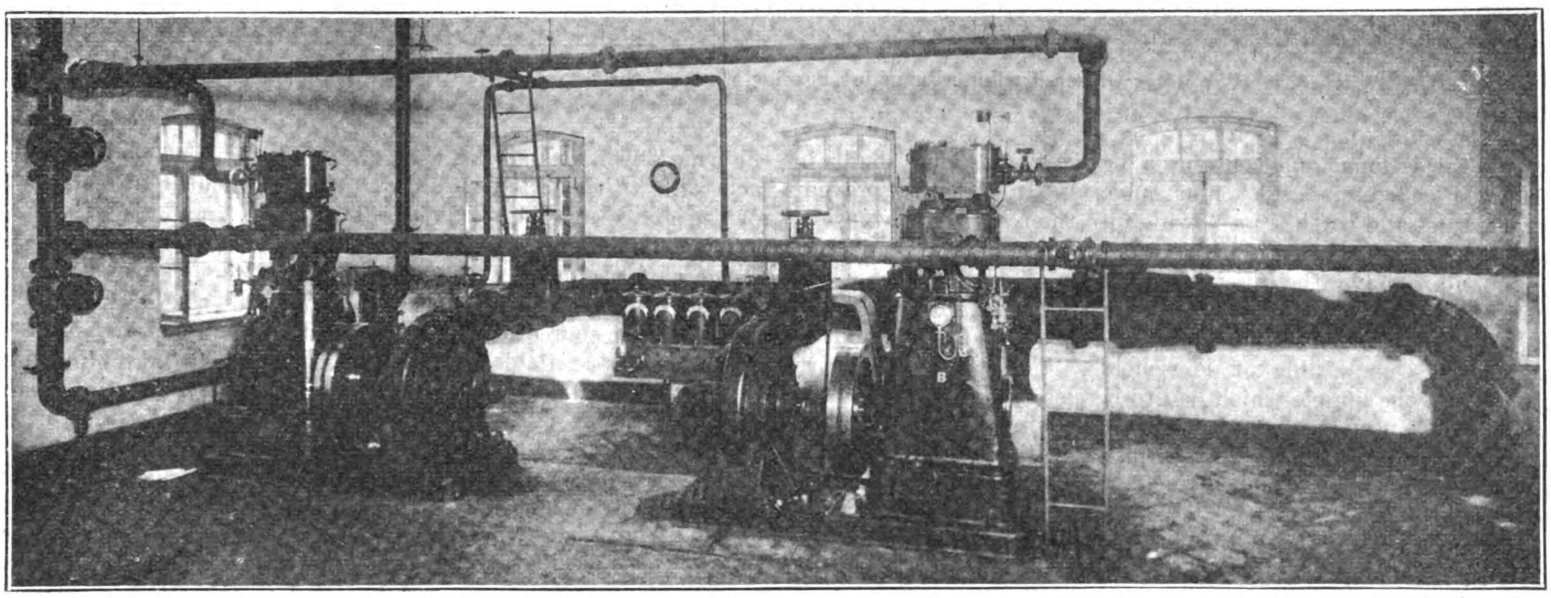
The passageway on the top of the dam is 8.7-ft. wide, hemmed with a line of breastwall made in concrete, 3-ft. high, on either side. At each edge of the passageway runs a drain, 4-in. wide and $2\frac{1}{2}$-in. deep. The bottom of the intake tower stands on the same level as that of the reservoir itself. It is 14-ft. from the bottom to the rocky foundation. The tower is semi-circular in shape, with a radius of 7-ft., and its inside face is vertical. On the outside it gently tapers upward at the rate of about 38/1000. The wall is 6-ft. thick at the bottom and 3-ft. thick at the top.

The outside is made of granite, $1\frac{1}{2}$-ft. or 1-ft. thick, $1\frac{1}{5}$-ft. high, and with varying widths; whilst the inside is built of stone, $1\frac{1}{2}$-ft. or 1-ft. thick and $1\frac{1}{5}$-ft. square with the use of 1.2 mortar, the space between both facing stones being filled up carefully with concrete made of 0.8 cement, 0.15 pozzuolana, 0.05 lime, 2.5 sand, and 4.5 gravels. On the top of the tower, a valve operating chamber is made of brick with a floor made in reinforced concrete, half a foot thick.

Four head stocks for opening and closing the valve are installed. The drain pipe projects out of the intake tower, and is surrounded with a wall, 10-ft. and 8-ft. long on the sides and 6-ft. high from the bottom of the reservoir, so that the accumulation of mud at the bottom may not fill up the drain pipe.

The overflow made at the left bank end of the body of the dam is faced with granite cut stone. The front overflow weir (constructed specially) is made of rubble concrete with rubble facing, having a contraction joint at the interval of 60-ft.

The overflow channel for the overflow weir is from 32.7-ft. to 58.5-ft. wide, with the bottom thereof slanting at 1/100. The foundation concrete is $1\frac{1}{2}$-ft. thick, with a stone facing 6 inches in thickness. From the point, at which the overflow water from the side overflow weir adjoining the body of the dam joins the water from the front overflow weir, the overflow channel takes the width



Intake Centrifugal Pumps in the Main Station

of 156-ft. to 94.5-ft. With regard to the longitudinal slope, it is $\frac{1}{30}$ in the middle and $\frac{1}{55}$ on either side. It is also made of foundation concrete, $1\frac{1}{2}$-ft. thick with as tone facing, 6 inches in thickness.

Transversally it inclines from either bank towards the middle at the mean gradient of $\frac{1}{50}$, so as to gather the flow to the middle. It terminates at the exposed cliff on the river bank which is 48-ft. high above the river bed.

The stability of the dam was computed with the specific gravity of 2.25 or 140.4-lbs. per cubic of masonry. The greatest stress on the toe of the dam is 6.04 tons per square foot, and the vertical stress on the heel is 5:5 tons, both being within the safe limit of the bearing power of the foundation.

The principal auxiliary works to the reservoir include, first of all, the construction of a new road along the bank of the reservoir. The dale forming the reservoir is situated on the so-called middle road between Dairen and Ryojun (Port Arthur). A new road had to be constructed along the hillside on the left bank, starting from a point about 400 yards below the dam. This road is 4,400 yards long, and contains a bridge, 90-ft. long, built in reinforced concrete, besides four culverts. In order to prevent gravels, sand and earth from flowing into the reservoir, two weirs in the main stream and four in the branch streams were built above and outside the reservoir. The land area purchased in connection with the construction of the reservoir comprised 140,146 *tsubo*. The Chinese houses caused to be removed numbered 25 containing 52 households. There were 53 grave mounds and one temple which had to be also removed.

Moreover, at about 120-ft. below the dam, a meter house to the leading main pipe was built, furnished with a simplex Venturi meter so as to measure the quantity of water sent to the filter plant at Shahokou.

From April 5th, 1914, on which the preliminaries were taken in hand three years and seven months intervened till the successful consummation of the work. The actual working days numbered 1,190. The total outlay amounted to Y 477,501.

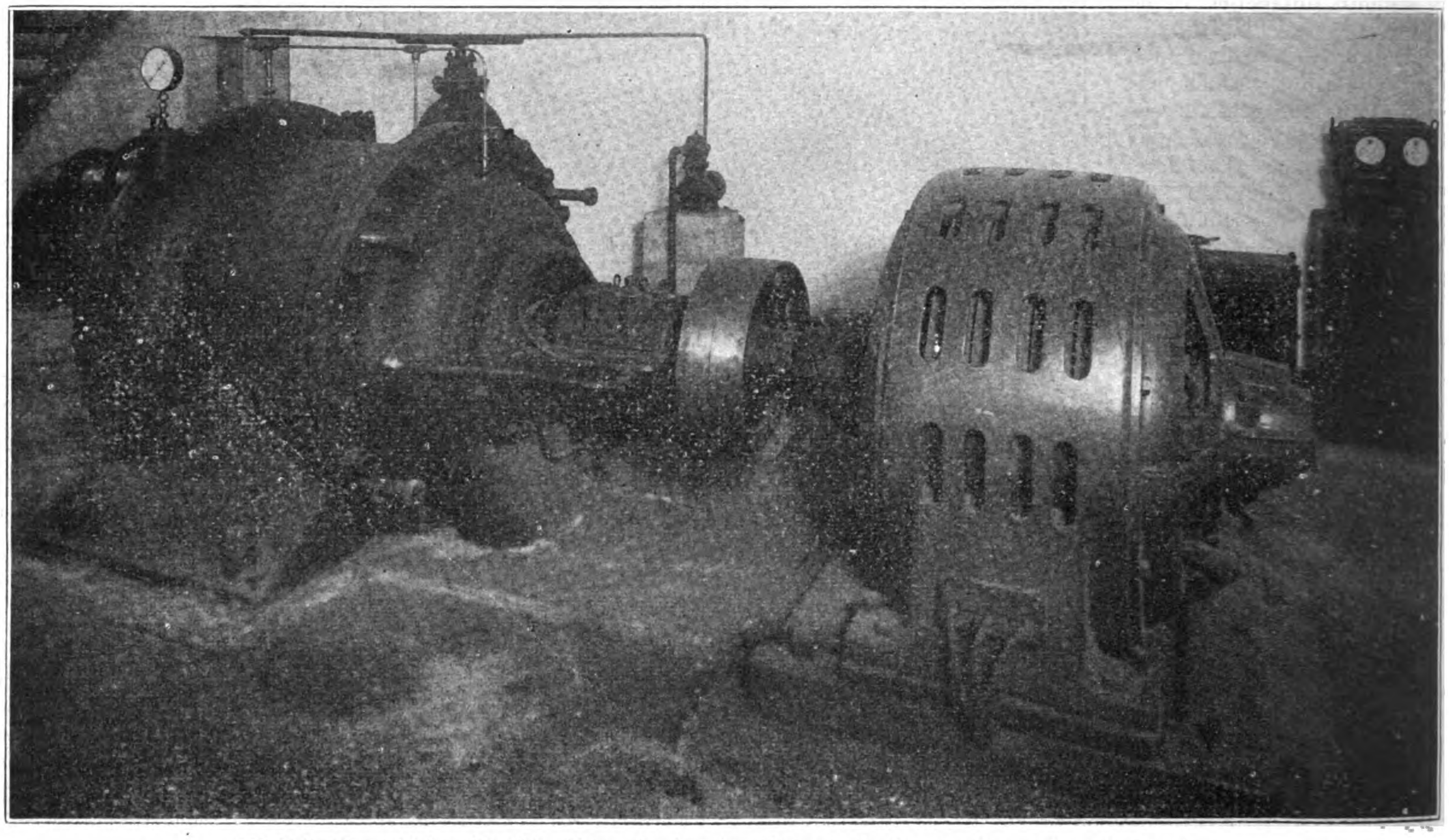
Conducting Pipe

The pipe line running from the reservoir to the filtration plant at Shahokou is 12,000 yards in length and is made of iron pipes, 20 inches in diameter. The water is sent by gravitation and the maximum daily capacity is 18,000 tons, being $7\frac{1}{2}$ cubic feet per second.

B. Water Source at Shahokou

The water source at Shahokou was, as already stated, executed according to the initial program. Out of the eight wells sunk by the Russians in the Malan River, each 20-ft. in diameter and 20-ft. in depth, four were found in a serviceable condition with more or less improvement. Below these wells, a blind dam was constructed across the river bed in order to intercept the underground flow and to raise the level of the ground water which is collected into the wells.

The river bed in these neighborhoods consists of a layer of gravels, from 20-ft. to 30-ft. in depth, and the underground flow filtering down, was no less than 220,000 cubic feet (or 6,100 tons), according to the Russian record. It was intended to make most of the above available. This water source, from the experience had during the water famine in 1917, may be considered to give a safe natural flow of 4,000 tons per day. Moreover, by the completion of the Wanghiatien reservoir, half the drainage area of this water source has been lost, and 2,000 tons a day may be put down as a reliable supply from this source. The blind dam is 1,680-ft. long, and reaches down to the rocky foundation at the depth of from 8-ft. to 30-ft. made of clay and concrete. On the top it is 3-ft. in width, and it broadens as it goes lower into the ground with a series of steps. On the upstream side of the weir, a conduit, 4-ft. wide and 6-ft. high, was provided. Each well is connected with 6-in. iron pipes, and the underground flow accumulating in the wells and conduit is sent down to the suction well by means of 14-in. pipes, and is raised to the settling reservoir by the intake centrifugal pumps.



350 H P. Motor Driven Turibine Pump for Forcing Water to the Service Reservoir at Fushimidai

C. Lanchiatun Water Source

This water source created hurriedly during the winter from 1916 to 1917 is situated at Lanchiatun in the village of Hsiaopingtao at 7½ miles west of the city of Dairen. It has a drainage area of 5.4 square miles. With an estimated water supply of about 600 tons, but its extension at some future date is in contemplation, so as to make it auxiliary to the Malan River water source. At this source, three wells lined with stone were excavated to gather the underground flow of the drainage area. Two of the three wells are connected each with a mortar pipe, 1-ft. in diameter, with the third well. Again, in the dale of Lanchiatun, about 1,720 yards above, a minor dam was constructed, and in the middle of this dam, an intake well, of 4-ft. in diameter, was sunk to gather both surface and underground flows, the water so gathered being conducted into the third well by means of 10-inch iron pipes. A pumping house was built at the eastern side of the third well, and by a Washington pump and also a centrifugal pump, the water passes through 10-inch forcing main pipes, 8,000 yards in length, into a concrete tank installed at the highest point of the line, and then it is sent down by gravitation to the settling reservoir at Shahokou.

The appurtenances comprise the following :—

1 Dam.—63-ft. long ; maximum height 23½-ft. wide, 6-ft. on top and 50 ft. at bottom ; made of clay puddle, the upper part having a stone facing.

2. Collecting Wells.—First well ; 31.1-ft. deep, 30-ft. in diameter, lined with stone wall and covered with a lid. Second well ; 14.3-ft. deep, 30-ft. in diameter lined with stone wall and covered with a lid. Third well ; 38.4-ft. deep, 30-ft. in diameter, lined with stone wall and covered with a lid.

3. Pumping Station.—Wooden flat building with basement built of stone. Machinery installed : In lower floor of basement : 1 Washington pump (of 35 horse-power). In upper floor of basement : 16-inch centrifugal pump equipped with semi-Diesel engine (of 25 horse-power). In surface chamber : 15-inch turbine pump (of Inokuchi system). Total head, 165-ft. capacity, 50 cubic feet per minute. 2 vertical steam engines (of 40 horse-power).

4. Tank : 30-ft. square in inside measure, 12-ft. in depth, made of concrete, covered with a lid, and having a capacity for 300 tons of water.

D. Equipments at Shahokou Filter Plant

1. Filtering Installation.—There are two filtering installations. One is the slow sand filter plant ; the other is the rapid filter plant. As the water is likely to get frozen in winter, the slow sand filter beds are built in the ground, and the cover is made in reinforced concrete, and on the top is laid a layer of earth at least 2-ft. deep. There are two filter beds, each 180-ft. long and 90-ft. wide. The filtering speed of each bed is 8-ft. a day, and the total filtering capacity is about 7,000 tons a day.

2. Rapid Filter Plant.—The rapid filtration process has been adopted for the second extension program. All equipments, apparatus and appurtenances were furnished by the Pittsburg Filter Manufacturing Co., of the United States, imported through the Toyo Shokai, No. 1 I-chome Yurakucho, Kojimachi-ku, Tokyo.

A detailed description of this plant will be given in a future issue of this publication.

C. Aeration and Settling Appliances

By this equipment, the raw water is brought into contact with the air either in sprays or in a thin layer. This process is repeated at nine places on varying scales.

For an ordinary filter bed, an ordinary settling reservoir is wanted ; and for a rapid filter bed, a chemical settling reservoir is required.

The Dairen Waterworks has both kinds of filter beds.

D. Clean Water Reservoir

The clean water reservoir is constructed under ground, 60-ft. square and with a depth of water of 8½-ft. It is divided into two compartments by a partition in the middle. In each compartment, the water route is constructed, so that it may flow through between two walls running crosswise, and when it reaches the edge of the chamber, it turns a little the other way and then takes a parallel line to the first, and so on. In this manner, the water keeps running in an almost zigzag manner.

E. Pumping Station

The pumping station is equipped with two kinds of pumps classified by their different purposes—one is the intake pumps and the other the forcing pumps.

(1). Intake Pumps.—The underground flow is gathered by the Shahokou wells (inclusive of the blind dam), and it is then pumped up to the settling reservoir by means of the intake pumps which are as follows :

Two centrifugal pumps, each 10-inch in suction diameter (head, 45-ft.: capacity, 1,800 English gallons per minute).

Two Cornish steam engines.

(2) Forcing Pumps.—By means of the forcing pumps, the filtered water in the clean water reservoir is sent to the service reservoir, Fushimidai.

Two triple-expansion vertical plunger pumps (head, 250-ft.: capacity, 1,800 English gallons per minute).

Two water tube boilers (Babock & Wilcox).

One three-stage electric-driven turbine pump (head, 320-ft. capacity, 2,500 English gallons per minute; actual horse-power, 350).

Of the above-mentioned three, the two first mentioned were installed on the first extension program, and the third was installed according to the second extension program. The trial operations of the turbine pump was completed at the end of March 1921.

Out of the three transmitting pumps, two are in constant use, the other being held as the spare one.

Their maximum daily transmitting capacity is 25,000 tons, which is more than sufficient for the existing capacity of the water sources.

Water Transmitting Pipes.—There are two water transmitting pipe lines, each 16 inches in diameter, running the whole length of 4,200 yards from the pumping station at Shahokou, to the service reservoir, Fushimidai.

Service Reservoirs.—There are three service reservoirs at Fushimidai, two of which are for distribution of water to the lower levels at Dairen, and the third to the higher levels.

Service Reservoirs for Lower Levels.—They are located at 190-ft. above the mean tide. One is of circular shape, and was installed under Russian regimé, capable of holding 80,000 cubic feet of water. The other is of square shape, with a capacity for 144,000 cubic feet.

They are both underground and constructed in reinforced concrete. The total capacity is 224,000 cubic feet, which represents half day's supply capacity of the Dairen Waterworks.

Service Reservoir for Higher Levels.—With the rapid growth of the city of Dairen in recent years, the strips of land at the foot of Nanzan Hill running from east to west in the south of the city have been converted into residential lots. Even, prior to this, the higher levels of the city have been shown to have too small a water head, giving only an unsatisfactory supply.

Therefore, for the second extension program, a service reservoir for the higher levels was constructed at the height of 290-ft. above the mean tide. Water may be sent up to this reservoir from the other reservoirs for the lower levels by means of two 8-inch turbine pumps, each capable of transmitting 108 cubic feet

per minute and lifting the water by 130-ft., and having 40 actual horse-power. The water thus obtained is distributed by a 10-inch service pipe to the higher levels at the base of Nanzan Hill and Osakamachi.

This reservoir is 60-ft. square with a depth of water of 12.6-ft. and a capacity for 1,200 tons.

SERVICE PIPES.—The service pipes range in diameter from 4 inches to 18 inches. The supply district includes Jijiko (east end), Tanchiatun (south of Hsiaokangtzu, Chinese quarter), Shahokou and Hoshigaura, in addition to the city of Dairen.

CONSTRUCTION EXPENSES.—Since the Dairen Waterworks passed into Japanese management, up to March 31st, 1921, the aggregate cost invested amounted to about Y.4,784,000 comprising the following :—

For 1st extension program	Y.994,000
For 2nd extension program	
Construction of impounding reservoir	Y.477,501
Laying of conducting pipes	335,808
Rapid filtering installation	161,179
Reconstruction of settling reservoir	84,526
Construction of clean water reservoir	25,776
Purchase of water transmitting pump, removal of pumps already installed and extension of pumping station	112,017
Installation for supply to higher levels	190,505
Laying of additional service pipes	257,569
Connections installed in purification plant	72,133
Purchase of machinery and tools, house building and office furnishing	101,986
Lanchiatun Waterworks installation	180,000
Laying of additional water mains	271,590
Laying of additional service pipes in city	519,410
Total	4,784,000

Chapter IV. Third Extension Program

The work on the second extension program was finished on March 31st, 1921, thereby quite completing the program. The third extension program was submitted to the extraordinary session of the imperial diet in 1920, and work was taken in hand in August of the same year, a brief outline of which is given under: The site for the new water source has been fixed upon Lungwangtang under jurisdiction of the Ryojun (Port Arthur) civil administration at about 18 miles west of Dairen. The Malan River valley has already been availed of to its utmost, leaving no further room for extension on a large scale. The need of some suitable spot being pressing, the Lungwangtang valley adjacent to the Malan River valley has been selected after a careful inspection of the district. The river consists of three branches, the longest running for almost nine miles. In geological structure, the Lungwangtang valley bears a close resemblance to the other. The river has little water running in ordinary times, but at a heavy rain, there will be a freshet just as in the other case. By constructing a reservoir at Kuanfangtzu at about 2½ miles from the mouth of the river, where it gets the narrowest, a large catchment area and a great storage of water may be made available. On this account, an extensive reservoir is to be constructed at this point, to dam up the river water during the rainy season. A pumping station will be built below the dam, and the water is to be sent to Dairen over the hills intervening.

The new dam is to be made of rubble concrete, being 121-ft. high and about 1,048-ft. in total length, of which 352-ft. is for the overflow and 180-ft. is for the earth dam. The new dam is to be 14-ft. in width on top and 92-ft. at bottom, with its body containing about 13,300 cubic *tsubo* of masonry The catchment area for the new dam comprises about 15 square miles; the new reservoir to be so formed is to have the water area of 480,000 *tsubo*, 75-ft. in maximum depth of water, and the effective storing capacity of 16,000,000 tons. Compared with the Wangchiatien reservoir, it will be nearly two and half times as large in the water area and three times as much in storage capacity. As regards the dam, the new one will be 25-ft. higher and over twice as large in actual volume of masonry.

For pumping power, the electric power house at Ryojun (Port Arthur) is to be enlarged, and transmitting wires are to be laid over the distance of about ten miles. Three turbine pumps, each of about 500 kilowatts, are to be installed.

The main transmitting pipes are from 24 inches to 22 inches in diameter.

At the time when the appropriation for the third extension program was asked, all materials were excepcionally high priced as a result of the great world war, and on this account, out of the consideration of economy, it was planned to lay transmission pipe lines, of 20 inches in diameter, with the length of 7,000 yards from the new pumping station to a point at 2,280 yards above the Wangchiatien reservoir through a tunnel, 3,200 yards in length, to be pierced through the watershed rising between the Malan River and Lungwangtang valleys. The water was thus to be discharged into the Wangchiatien reservoir by natural inclination, to be led by means of the existing conducting pipes into the purification plant at Shahokou.

However, as the materials, labor, etc., have gone down since, and especially as the daily local consumption has sharply increased quite beyond the original expectations, the question of supplanting the above plan with another, by which the water may be conducted more advantageously from the new Lungwangtang Pumping Station direct to Shahokou by the shortest cut viâ Huangnichuan, is under consideration.

When the new extension program is completed, the supply capacity of the Dairen Waterworks will consist of 22,000 tons from both Wangchiatien and Lungwangtang, 2,000 tons from the Shahokou wells, and 600 tons from Lanchiatun, giving the total of 24,600 tons, which is about twice as much as the present capacity.

The same work was started in 1920 and is to continue to 1924, the total cost reaching Y.4,681,380 which sum is apportioned according to the years as follows :

Fiscal year 1920	Y. 433,500
,, 1921	1,192,495
,, 1922	1,243,895
,, 1923	1,103,495
,, 1924	707,995

Hongkong Reclamation Scheme

Work in connection with the Praya East reclamation scheme was begun on November 1st. The contract was awarded to Messrs. Sang Lee & Co. whose tender was $2,766,899.70.

The contract period runs for six years but the job may be finished before then. The contractors have established their offices in the building which used to house the Corinthian Yacht Club and a commencement has been made with the erection of officers, workshops and workmen's houses.

The first thing will be the laying of intercepting drains for taking away the discharge of sewers and stormwaters which at present discharge through the Praya Wall, and to construct open drains. Temporary transport lines will have to be laid down for the hand waggons which will be used pending the arrival of locomotives which are expected to be available early next year.

In order to dredge out the trench for the sea wall a contract has been awarded to the Anglo-Chinese Engineering Association, Ltd. who are co-operating with Messrs. Bailey & Co. for the supply of a Priestman self-propelling steam grab dredger mounted on a new steel barge. The dredger has to be delivered by April 13 next and until then it will probably be found possible to employ at intervals the dredger at present in the service of the government.

The Far Eastern Review

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ENGINEERING FINANCE COMMERCE

5 JINKEE ROAD, SHANGHAI CHINA

Telegraphic Address: Farview, Shanghai

SHANGHAI, NOVEMBER, 1921.

Japan's Militarism

NO series of articles about Japan has caused such widespread regret amongst Japanese as those recently written for the *New York Herald* by Mr. Louis Seibold. Mr. Seibold is unquestionably the foremost political writer in the United States. His knowledge of New York state and national politics and his intimate relations with the great men of the nation have made his name known to every serious student of American affairs. For twenty years he was the star writer for *The New York World*, and while connected with that journal, his views on the Far East, vague as they were, coincided with its general policy on these questions. No one in American journalism would question for a moment Mr. Seibold's integrity, independence of thought and ability through years of training, to analyze correctly a political situation, yet in his conclusions about Japan he has utterly failed to live up to his past high reputation.

It would be useless to attempt at this time to refute or correct the many mistakes in Mr. Seibold's arguments, especially those dealing with Japan's militarism. Mr. Seibold stayed only a month in Japan during last summer, and it is difficult to believe that even a journalist of his calibre, analyzing a new and complicated problem, could reach exact conclusions in that short length of time.

The Japanese militarists have had their day. They saved the empire from extinction in 1905, and, if they had gone to sleep at the switch any time previous to the break-up of Russia in 1917, their sacrifices would have been in vain; Japan would have ceased to exist as an independent nation. Much new light has been shed in these problems by the publication of Count Witte's memoirs and the disclosures of state papers in other countries. No fair-minded writer with a knowledge of these facts can honestly condemn the Japanese militarists for keeping the nation keyed up to the highest state of preparedness.

Japan's militarists are no exception to their prototypes in other parts of the world. They have a specific duty to perform, in which sentiment has no part. They have made mistakes. They have been, at times, unnecessarily severe, but even in this, have not departed from precedents set by every other army in the world occupying alien territory.

We entertain no illusions about Japan's militarists. Any other body of he-men placed in the same position would have done exactly the same, and any other body of he-men would have made the same mistakes. If the critics of Japan's militarism could look behind the screen that concealed to the rest of the world the moves of Russia up to the date of hei fall, their sympathy would go out to the heroic defenders of Japan and appreciation take the place of condemnation. They were up against a proposition before which the position of France and England *vis-à-vis* Germany, was child's play. Aside from England, they had no real friends, and it is only natural that time after time they imposed their will upon the government.

The military party in Japan frankly admits its blunders, but they say in effect, we have been pushed hard and placed in a desperate position. "If, at times, we have over-stepped the rules of the game learned from the West, the Western powers who closed their doors to us and then followed us into Asia in an attempt to hamper and circumscribe our expansion and measures for self-defense, while our back was against the wall, cannot be held altogether blameless." The leaders of a nation of 70,000,000 constantly menaced on one side by a foe outnumbering it four to one, and on the other by the constantly growing animosity of another rich and powerful people; forced to watch the slow and steady strangulation of their national life, cannot fairly be held to strict accountability for all they might do in sheer desperation to defend themselves.

It is the failure to recognize this fact that gives rise to misconceptions about Japanese militarism. If Count Witte is accepted as a reliable witness: if it is true that Russia was preparing to resume the conflict in 1912; if it is true that Russia and China were partners in a secret alliance aimed against Japan, then the world should stop this incessant nagging of a people whose one "crime" is a determination to fight like men for the preservation of their national independence. Until other facts are adduced that will disprove those revealed at the peace conference and in Witte's book, it is useless to continue to condemn the Japanese for qualities which all other nations are proud to possess. When foreign criticism of Japan's general staff is directed against its interference with the foreign relations of their government, the rest of the world will find all liberal Japan in full agreement. The only justification advanced by the militarists for such interference lies in the fact that their duty to the empire can never be altogether concluded. They dare not sleep while Russia remains an unknown quantity. To have relaxed their vigilance in Eastern Siberia at any time within the past two years, would have invited the flooding of Manchuria and China by the hordes of Lenin. Yes, the Japanese militarists have made mistakes. They will continue to blunder, but after all is said and done, they are very human, very little different from great figures of ancient and modern history the western world is proud to honor.

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Taikoo's Generous Gift

ENGINEERS in China will appreciate the generous contribution to the Hongkong University for the endowment of a Taikoo chair of engineering and the engineering section of the university from the firm of John Swire & Sons. This is not the first time that this firm has manifested its interest in the university, for in 1909, the three firms of John Swire & Sons, the Taikoo Sugar Refining Company, Ltd., and the Ocean Steamship Company, jointly contributed the splendid sum of £40,000 in proportions of £30,000, £5,000 and £5,000 respectively towards the endowment fund of the university.

In commenting on this gift, the *South China Morning Post* says:

"Hongkong is fortunate in possessing such generous and public spirited firms and whilst they continue there should be no fear of the university's good work suffering from lack of support. With regard to the specific object of this most recent gift no subject is more worthy of support in Hongkong than engineering.

"The shipbuilding industry has developed wonderfully within the last few years and promises to expand still more rapidly in the future when the trade slump disappears. Engineering plays an important part in shipbuilding and it will be a great advantage to the colony to find her future engineers on the spot instead of seeking for them elsewhere."

The publicity given to more magnificent endowments for the cause of education in China, tends to overshadow other equally meritorious contributions, of which Taikoo's has a most far-reaching bearing on practical training and the development of engineering in this part of the world.

A New Era in the Philippines

Governor-General Wood's Inaugural Speech

"I appreciate, more than I can tell you, this cordial welcome and the spirit which prompted it. I feel highly honored by the confidence of the president in appointing me to this most important post, and deeply touched by the cordial expressions of approval of his action by Filipinos and Americans.

"It is my purpose, so far as lies in my power, so to conduct the government that it will be characterized by economy, efficiency and true progress ; a government of the people by their representatives to the extent provided in the Jones Bill ; a government characterized by honesty, morality and an appreciation of the fact that public office is a public trust ; that fitness is an absolute requirement for appointment to office. There must be no turning back, but steady progress on sound lines.

Governor-General Wood

"The Philippines people have made wonderful progress in the last twenty-three years. I doubt if any people, under the friendly guidance of another, have made a greater advance in the same period of time. This has not been accomplished by the Filipinos alone, but with the absolutely unselfish aid of the United States, acting through thousands of loyal, unselfish Americans who have worked with an eye single to the best interests of the people of these islands.

"Although Oriental in blood and birth, the people of the Philippine Islands are closely allied in religion, in ideas of government, in methods of administration and in law, to the great Christian nations of the West and especially with America as to form of government, civic and religious liberty and liberal institutions. As a people, you were born and educated as Christians. There must be no sliding backward in the Christian faith. In this connection it is well to remember that the first sign of the decadence of a people is a disregard of religion. That a people be well grounded in their faith is essential to real stability and progress.

"Your enthusiasm and thirst for education and your accomplishments in building up a sound system of public education is beyond praise. We must keep it up. Indeed, we must extend and improve it. Education must be free to all. Your women must be given equal opportunity with your men. Nothing I have seen in the islands has impressed me more than the character, loyalty, thrift and all-around good influence of the women of the Philippines.

"The government must encourage, not discourage, private enterprise. As a general policy, I believe that the government should keep out of business. The Judiciary must be independent and stable and kept absolutely outside the scope of political influence and out of politics, for an independent, fearless judiciary is the foundation of stable government.

"We must push forward our public works, especially roads and irrigation. We must give far more attention to public health and sanitation. Too many precious lives are lost each year that could be saved, and easily saved. Almost one-third of all the children born in the Philippine Islands die in the first year of their lives, a frightful indictment of our sanitary and health conditions.

"We must provide the remedies for the cure of our lepers, for a large proportion of them can be cured. We must take better care of our insane and defectives.

"We must do all we can to build up a fuller appreciation of the dignity of labor ; of the obligations of citizenship ; to increase our agriculture and push forward the development of our natural resources, and so organize and conduct the government that funds adequate to the needs of progress and development will be available. We must live within our income. Above all, we must work together to a common end—the welfare and happiness of the people of the Philippine Islands. We must hold on to sound principles and policies. This is no time for rash experiments. We must keep our feet on the ground and remember that our road lies ahead of us, not behind.

"My purpose is to do the best I can to reestablish the credit of the islands ; to build up their commerce, increase the prosperity of the people and make the government a model of efficiency. This I cannot do without your co-operation and support, all of you, Filipinos and Americans and others living in the islands. With your co-operation the work will be easy, for the spirit of the people is excellent and the natural resources enormous.

"We must do all we can to build up an instructed public opinion, for without it true representative government cannot endure. In this the press is charged with a great responsibility. We must do everything possible to push forward the study of English, and make English the language of the people of the islands. Nothing will do more to strengthen the spirit of solidarity and aid in developing an instructed, sound public opinion than a common language.

"The establishment of a sound, stable, representative government in the Philippine Islands must not fail, for the far-reaching effect of the efforts which we have made here, in the Orient, to establish such a government extends far beyond the limits of the Philippine Islands ; indeed, it reaches out to every people who are dreaming of liberal institutions and of government by the people. It shall not fail, because the United States has put its hands to the plow and will not turn back.

"In the great work before us I bespeak your co-operation and assistance. Working together, we cannot fail."

* * *

The Keys of Empire

IN an article entitled "The Keys of the World" appearing in the April number of THE FAR EASTERN REVIEW, the strategical position of the Philippines was reviewed in the light of their post-bellum importance. The Philippines have become the keys of empire, the buffer between Asia and Australia, the guarantee against attack upon India from the East, and upon Japan from the South. Independence of the Philippines must carry with it the ability to preserve their neutrality by the creation of a defensive force of sufficient strength to ward off invasion and prevent the use of any of the islands as submarine bases. That this point was sound is now seen in the fact that the first step to be taken by Governor-General Wood is the creation of such a force. The Philipino must stand the burden of taxation for his own defense. Without this, independence of the islands would be impossible.

Lord Northcliffe, during his visit to Manila, was quick to see the above point and marvelled that the Filipino should ask for independence, when they are far better off than Australia or Canada which have to pay a large portion towards their own defense. During his stay in Sydney he also sensed the danger to Australia from overcrowded Asia and stood amazed at the indifference of the Australians to their future.

The one barrier to the southward movement of the overcrowded millions of Asia is the Philippines, the stepping stone to New Guinea and Australia. No human power can regulate this racial flow towards the islands of the south seas if the Asiatic is deprived of his right to exist in Asia. If the waste lands of China are to be inherited by the Slav, if Japan is denied the right of colonization on the mainland, then the danger to a white Australia predicted by Lord Northcliffe cannot be averted.

* * *

Getting Down to Business in the Philippines

IN this number of THE FAR EASTERN REVIEW appears two articles on the Philippines, one from the pen of Mr. George H. Fairchild, unquestionably the foremost authority on the sugar industry in the islands, and the other from Mr. Warren D. Smith, the highest government expert on their mineral resources. Mr. Fairchild makes an earnest plea for the admission of Chinese labor as holding out the only hope for the further development of the sugar industry, while Mr. Smith laments the failure of American capital to develop the mineral resources of the islands, to the extent that the industry has depended in the past and must still, to a large extent, fall back upon New Zealand, Australia. and *China Coast capital.* Both of these gentlemen, experts in their respective industries, have placed their fingers on reasons why the islands have lagged behind and why they will continue to be a liability until a new program is designed and put into practice.

The root trouble with the development of the Philippines is the natural disinclination of the native to hard work. The keynote of American policy in the islands, the groundwork of our experiment in colonial government, is education, with the result that every high or primary school graduate adds one more aspirant for clerical or other tasks calling for little or no physical exertion. The present generation, the product of this system, is pre-eminently intellectual, with a craving for politics and government jobs. Another ten or twenty years of American rule along these same lines will turn out a new generation fitted for everything in life except toiling in the paddy, hemp or sugar fields. Who, then, will furnish the labor so that the intellectuals can exist ?

Let us turn to a dispassionate consideration of a few cardinal, incontrovertable and perhaps, unpalatable facts, and try and see where a continuation of the present system will lead us.

1. An independent Filipino republic carrying an Asiatic exclusion law on its statute books is an idle dream. Neither China or Japan would consent to the extension of the principle to an Asiatic country, once the protection of the United States is withdrawn.

2. The United States government is compromised to concede independence to the Filipinos when they reach that stage where they are competent to govern themselves. That day cannot be indefinitely postponed.

3. The first requisite to independence is ability to safeguard it, and preserve neutrality in the event of a Pacific conflict.

4. To maintain an effective defensive force and fulfill their international obligations, the Filipinos must stand the burden of taxation.

5. Revenues for the maintenance of such a force can come only from exploitation of the resources of the archipelago.

6. Industrial development on any scale of magnitude sufficient to assure adequate revenues, depends upon investment of capital and willingness on the part of the natives to make it productive. Experience tends to prove that the Filipino can never be depended upon to provide the labor that will make such investments either desirable or profitable.

7. The concensus of opinion amongst practical business men is that the native will never supply the labor necessary for profitable development of the insular resources, and unless Chinese are admitted, the future holds out little hope for any great expansion of industries.

If we accept the above, we have the following formula. The United States are compromised to grant independence to the Filipino; this carries with it the elimination of Asiatic exclusion laws ; ability to maintain independence rests upon increased revenues in order to pay for an adequate defensive force ; this can be derived only from development of industries and resources, impossible under present labor conditions. What is the solution ? Why not accept the inevitable, repeal the exclusion laws as far as they extend to the Philippines, and permit the entrance of Chinese labor (under certain restrictions) that will develop the much needed industries and bring revenues to the insular treasury. In no other way does it appear possible for the wealth of the islands to be properly developed within a reasonable length of time, and provide revenues to enable the United States to turn them adrift under conditions that will permit us to entertain a reasonable expectation that the infant republic will survive.

Although the plea of Mr. Fairchild has been shelved, the question must again come to the fore and receive serious consideration from the American and Philippine governments, if the former is ever to be in the position to carry out its pledges. Aside altogether from this phase of the question, the Philippines are a storehouse of tropical wealth, of necessary raw products which other peoples of the world will demand in yearly increasing quantities. If the natives refrain from contributing voluntarily their quota to the expanding necessities of mankind, the day will inevitably arrive when pressure will be brought to bear on them to work and produce, or make way for others who will. The Philippines lie at the door of other virile, hardworking and expanding nations, who, as time passes, will never consent to the islands being isolated, and closed to the entrance of their people with equal opportunity to trade and to own land. Other nations, not so altruistic as the United States, may decide that the islands in other hands will contribute their resources more usefully to the necessities of mankind. The time is past when a country like the proposed Filipino republic can be held for the Filipinos and bar out foreign capital seeking to develop sources of much needed raw materials.

Adhering to the argument advanced by Mr. Fairchild, the day is not far distant when the millions of Asia will look more and more to the Philippines for their supply of sugar. As Mr. Fairchild points out, the islands of Java and Formosa have about reached their limit of sugar production. Their rapidly increasing population will require more and more land on which to grow rice and food stuffs, and sugar must give way to the more necessary staples. Japan is constantly increasing her consumption of sugar, and when the Chinese masses cultivate a taste for the higher grade product, the Philippines will be called upon to meet the demand. What has been done by Japan in Formosa and by Holland in Java can be duplicated in the Philippines, but all inducements and subsidies, in addition to free trade with the United States, will not suffice to develop the industry if the natives refuse to furnish the labor, and their government enacts laws barring out people who will.

The question is one that has a most important bearing on the future of the islands. Unless the American people are willing to shoulder the responsibility as Mrs. Elenor Frances Egan puts it, of preserving "the Philippines for some Filipinos," the labor problem with its corollary, the Asiatic exclusion law, must be squarely faced. We do not believe that the altruism of the American people will rise to that height, where they will consent to stand guardian over one Asiatic nation to preserve its lands from development by other Asiatics. As long as America continues to approve of the enforcement of laws in the Philippines designed to meet the peculiar economical and labor problems at home, the Filipino laborer will be protected against competition. Under our wing the native politician catering to the labor vote, will continue to agitate against the admission of Chinese and to prohibit Japanese from owning land.

The initiative in this matter must be taken by the Filipino legislature which has full power to pass the necessary laws providing for the admission of alien labor. It is hardly probable that the American government would veto or interfere at this time with the right of the Filipino to provide ways and means that will pave the way towards the fulfillment of its promises. If the Filipino is to enjoy independence at some future date, no time should be lost in the enactment of a law to regulate the immigration of aliens into the islands under some form of contract that will stimulate investments for the development of their resources. The land laws should be revised in order that capital can take up sufficient land for development, and under conditions that will guarantee that such rights will not be abrogated or properties confiscated under legislation similar to the recent attempt to penalize all foreign holdings under pretext of keeping the Japanese out.

As long as Americans are reluctant to invest in the islands, their future prosperity must necessarily depend to a large extent upon investment of capital from nearby countries. There is no good reason why Japanese capital should not assist in this development. The islands produce many staples required by Japanese industry. There is no good reason why Chinese capital should not be invited into the islands, but it is rather far-fetched to ask the Chinese to invest in Philippine enterprises while excluded in person. As illustrative of this point, we again turn to the statement of Mr. Warren D. Smith, in regard to the necessity of the mining industry falling back on China coast capital for its development. At the present time, a representative of one of the largest mining enterprises in the Philippines is in Shanghai endeavoring to have the shares of his company listed on the local stock exchange. Owing to a previous disastrous experience with Philippine mining shares, the local brokers are rather opposed to any further transactions in insular enterprises, and despite the gilt-edged character of the shares in question, considerable difficulty was experienced to obtain official stock exchange recognition that will permit the shares to be dealt with on the Shanghai market. People in the Philippines labor under the impression that China Coast capital is necessarily foreign, when as a matter of fact, a large percentage of capital in recognized share companies, represents Chinese investments. To ask the Chinese to take an interest in developing Philippine mines or other industries, and then close the door to their entrance, is, to say the least, the height of inconsistency.

A bill has recently been introduced in the Philippine legislature to remove the restrictions on immigration, so that within the next few years, the population of the islands may be increased to 50,000,000, indicating that the thoughts expressed in this article are receiving serious consideration by Filipino politicians. The measure is expected to meet with strong opposition from the native labor unions who fear the effect of competition. Their fight is championed by Mr. Manuel Quezon who derives his political support from this element.. At the same time, this gentleman is the foremost advocate for independence, and would rather see the islands "run like hell under its own government" than continue to remain dependent upon the United States. But it is safe to say that unless some solution is found to this labor problem, that not only will the Philippines be run in the manner aforesaid explained by the illustrious and forceful Filipino orator, but their very name will become synonimous with the same superheated locality.

Of course, if the United States is to remain the perpetual guardian of the Philippines, it makes little difference whether the native is encouraged to work or not. And here we come to that phase of the question embraced in a recent resolution of the American chamber of commerce of Manila advising against the investment of American capital in the Philippines until a permanent political status or territorial government is obtained. This decided stand was rendered necessary because of governmental antagonism to American investments and lack of suitable guarantees and protection. Only in the large commercial centres, the chamber declares, such as Manila, Cebu, Iloilo and Zamboanga can even partial protection be obtained, while the provinces are no longer suitable for American investment or business operations owing to the lack of protection from political antagonism.

In other words, the American community in the islands have set themselves firm against any further hazarding of American capital in the islands, unless a permanent governmental policy is adopted. It is difficult to reconcile the business man's cry for territorial government (implying an indefinite prolongation of American rule) with oft-repeated official pledges to grant independence. A territorial status will perpetuate exclusion of other Asiatics and impossibilitate any great development of insular resources, with the result that Americans holding properties in the islands, would stew in their own juice.

It is natural, however, that American business-men in the islands should desire to continue in some form or other the attachment with the homeland, for once the bond is severed, the bottom will drop out of business and the work of years be lost. We are convinced, however, that the political problem will solve itself if the labor question is properly handled. Once American and nearby capital is satisfied that their investments in the islands will be secured against confiscatory laws designed by immature politicians, and that the necessary labor will be forthcoming to permit them to operate profitably, the political atmosphere will be cleared for all concerned. Sentiment in the shape of the native labor vote may defeat the efforts now being made to remove the restrictions on immigration, but common-sense tells that only by the rapid influx of Asiatic immigration will the islands ever come into their own.

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"The Scandal of the Shanghai Mint"

THE October number of the *British Chamber of Commerce Journal* of Shanghai, sets forth at length the British protest against the Chinese government's idea of a fair tender as embraced in the methods employed in placing the contract for the Shanghai mint.

The *Journal* says that "to begin with, the fact may be recalled that the project of having a mint in Shanghai is largely due to the energy of the associated British chambers of commerce and to articles which have appeared in this paper. In October two years ago the *Journal* published an article called "The Dollar *versus* the Tael" which, after showing how the dollar had of recent years tended to oust the tael, took up and added to practical suggestions for currency reform made by the foreign exchange banks in 1917. The first of these suggestions was that the foreign banks, acting together, should intimate to the Chinese government that they were prepared to wipe out the tael from their accounts altogether, provided the government would open a mint or mints for the free coinage of dollars. In the following month, when the British chambers of commerce in China and Hongkong held their first conference, Mr. A. G. Stephen, then manager in Shanghai of the Hongkong & Shanghai Bank, moved the following resolution, which was seconded by Mr. C. A. Fraser, representing the Hankow chamber, and passed unanimously :—

"That the Chinese government be strongly urged to take steps to discontinue the use of sycee and to establish a uniform currency of dollars and subsidiary silver and copper coinage throughout the country: to open a mint in Shanghai for the free coinage of dollars and to place other mints under efficient control, so that uniformity of standard may be preserved."

"The effect of this resolution was more immediate than most people at the time expected it to be. By the 30th of the following month, December, the proposal to build a mint was being taken up in a business way and by March 10, 1920, Mr. M. Y. Chung, chairman of the mint commission, was in communication with firms in Shanghai. He had no specifications of his own at that time and declared himself willing to consider suggestions put forward. On may 6, 1920, quotations were sent to him and on May 12 he acknowledged their receipt and trusted to be favored with details at any early date. On May 29 he wrote to the effect that as soon as detailed suggestions had been received from all firms interested he would fix a date on which all were to tender formally."

"Throughout this preliminary period the mint commission's policy was businesslike, straightforward and fair. It was, to all intents and purposes, in this position. 'We want' it said to British and other firms, 'to build a mint. We have no pre-conceived ideas on the subject. In fact, we have no details to set before you. We can indicate to you, roughly speaking, what the capacity of the proposed mint is to be and we want you to let us know how, if we asked you to build and equip it for us, you would set about doing so and what it would cost. When we have got your ideas we will issue a set of general conditions, fix a date for the receipt of your formal tenders and choose what we consider the best tender put forward.'

"It was on this basis that British firms set to work and, needless to say, they went about the business in a thorough, painstaking way, sparing neither time nor money to get out preliminary quotations. This work occupied them till November 1920, when, the mint commission issued the following specifications. :—

The *Journal* then goes on to quote the general specifications issued by the Chinese government mint commission calling for the detailed estimate of a complete minting plant with capacity of a daily output of 400,000 finished silver dollar coins, working actually ten hours a day, or the alternative output of 600,000 subsidiary coins (50-cent, 20-cent and 10-cent pieces in equal proportions) using the same power plant and preparatory machinery but with extra coining presses and accessories for the same period (during which the mintage of dollar coins, is, of course, suspended). Tenders for this plant were to be sent in not later than November 16, 1920, and in accordance with the above, tenders were submitted by one Japanese, three Chinese, four Americans, one Dutch and six British firms.

Naturally, the interested tenderers thought that this would lead to the placing of the contract, but to "the amazement and disgust of the British firms concerned, on May 6 of this year, an entirely new set of specifications were issued," to be sent in not later than 11 o'clock on June 24, 1921. The form of tender had to include every item of the complete coining equipment, with details of costs of each item of the various appliances in gold currency.

Then followed a complete list of each item specifying in every case some special product of American make, even to the electric motors. Taken with the time limit of fifty days in which to get specifications home, examine them, work them out, make out prices and return them with blue prints to Shanghai aroused not only the ire but the disgust of the British firms who had taken such pains in the beginning to make a careful study of the project. This feeling was heightened from the fact that the new set of specifications were signed by Mr. Clifford Hewitt, the newly appointed American technical mint expert to the commission.

When the altered specifications were published the British chamber of commerce at once wrote to the British minister at Peking, and on July 15 was informed that a protest had been lodged and met with an unsatisfactory reply, of which the following was a part :—

"In the purchase of all the machinery for the Shanghai mint the criterion employed for the pattern of such machinery is suitability for Chinese use. Manufacturers of all nations are free to compete and there is no intention to impose restriction in respect of the merchants of any particular country. Moreover, the matter lies within the sphere of the administration of the mint, and the director of the mint enjoys by right freedom of action and of selection nor does he indeed submit to any restriction whatsoever."

This rejoinder was followed by a further protest to the finance minister and the currency bureau replied by repeating their former statement as to the absence of any restriction of important parts of the contract to machinery manufactured in any particular country, and by asserting that the time limit, 50 days, was more than ample for enquiries as to price to reach British manufacturers by mail. A summary of this second reply was sent to the chamber on September 9, seven days precisely after the issue by the mint commission in Shanghai of further specifications, namely, for strong room doors, safes and fire-proof safe cabinets, while amongst the photographs attached to the specifications is one showing a Herring Hall Marvin strong room door, which can only lead to the conclusion that the order will go to that company. And this second set of specification is issued after the protests made by H.M. Legation detailed above."

"Time was when such protests were listened to adds the *Journal*, and time was also when the Chinese government, had some sense of commercial decency. That time appears to have passed and the *Journal* commends the fact, and the others contained in this article, to the attention of the British public both in China and Great Britain and in particular to such representative associations of British manufacturers as the Federation of British Industries."

Here we have a typical case that as time passes must be repeated time and again in some form or other. The British position seems to be well taken, and if the shoe was on the other foot, Americans would protest just as loud and just as strong. The real difficulty undoubtedly lies in the methods pursued by the Chinese authorities in the first instance by inviting general tenders from all sides, then throwing them out and calling in an American expert, who most naturally specified, what his judgment deemed the best machinery procurable. There could have been no criticism or hard feelings had the Chinese called in the services of such an expert in the first place and invited tenders on his specification. That, undeniably, is the prerogative of the Chinese government. Had the expert been British or French, his recommendations would undoubtedly have favored the manufacturers of his own country. In this case, he was an American, with the natural consequence that all the machinery specified is American.

It is difficult to hope for harmony when such practices are permitted to rule the placing of Chinese government contracts, for with this precedent, the next time a British or French expert is called in for any particular engineering advice, we may expect that American machinery will be conspicuous by its absence from the specifications.

* * *

Courting Disaster

NOTWITHSTANDING an official warning issued by the ministry of agriculture and commerce, against the investment of foreign capital in Chinese stock and produce exchanges promoted in the treaty ports, the number of these bucket shops is constantly growing. Hardly a week passes without the registration of several new enterprise of this character, until one stands amazed at their variety and scope. For the purpose of protecting the interests of the public against dishonest speculators, the above-mentioned ministry in August sent an official dispatch to the waichiaopu requesting that the legations be notified to caution their nationals against joining with dishonest natives in forming these so-called exchanges without government sanction. The minister was firm in his belief that unless the evil be checked in time, it will work havoc on Chinese commerce industry and finance, and impede economical reconstruction. He affirmed that Chinese promotors had induced foreigners ingorant of Chinese laws to form these joint exchanges in the hope of utilizing the protection of a foreign flag in order to evade the imposition of Chinese laws and taxation.

The creation of these exchanges, however, fails to keep pace with the new banks springing up like mushrooms all over China, in many cases promoted by officials in control of national, provincial or municipal finances, and whose aim is to speculate in Chinese bonds and loans. The extent of these transactions is revealed in a recent summary made by the *Kuo Wen News Agency*, which shows that during the past several months a sum exceeding $40,000,000 has been advanced to the Peking authorities all secured on the salt surplus. Some of these loans have been made by established and reputable foreign banks, but the list shows names unheard of a year or so ago in Chinese finance.

More than 50 different loans through 20 odd banks make up this huge sum. The larger part of the money comes from Chinese banks, but the foreign banks have loaned not a small amount to Peking.

The Bank of Communications has lent $4,000,000 in two payments ; the Russo-Asiatic Bank has made 12 loans, $1,000,000 the first time and smaller sums on various other occasions. A loan of Marks 5,000,000 was also made by the Russo-Asiatic Bank, which has loaned in all about $4,000,000 ; the Putung Banking Corporation (backed by the Yokohama Specie Bank) $3,000,000 ; the Pien Yih Bank, two loans totalling $1,750,000 ; the Peiyang Commercial Bank, twice, totalling Y.120,000 and Y.1,200,000 ; the Hongkong & Shanghai Bank, four times, totalling $1,200,000 ; the Exchange Bank of China, $500,000, Y.4,040,000 and Marks 500,000 ; the Yen Kee Bank $1,000,000 ; the Shen Kee Bank, twice, totalling $800,000 ; the Ming Hua Bank, $500,000 and Tls. 700,000 ; Asia Development Co. Y.2,500,000 ; Ko-ngo Bank Y.450,000; Okura Co. Y.2,450,000; Bank of Commerce, Frs. 4,250,000 ; Yung Tah Bank, Frs. 1,000,000 ; and the Sino-Italian

Bank, Lire 1,200,000. Other banks have loaned smaller sums of from $200,000 to 300,000 to the extent of $1,600,000.

The total amount of the salt revenue is $80,000,000 per annum, but with the southern provinces, as well as Chang Tso-lin and a few military leaders in the North, withholding their shares, the actual income received by Peking from this source is about $12,000,000. This amount certainly is not enough to cover these loans amounting to $40,000,000, plus interest. If this is kept up even next year's surplus and the year after next will not be sufficient.

The year 1921 will go on record as the most memorable in the history of China's finances, a year of robbing Peter to pay Paul to escape national bankruptcy. How long it can last, only the Chinese themselves are able to tell. The day the orgy is over, and the chief business of many mushroom banks is withdrawn, it is not improbable that a panic will be precipitated that will carry many foreigners down to ruin in the general crash.

* * *

Baiting the British

"*NORTH of the Yangtze for Nippon, south of the River for Britain, a slice of Liangkwang and a nibble of Yunkwei for France, if, unlike little Jack Horner, she sits in a corner and keeps her fingers out of the Anglo-Japanese plum pie.*" Sounds like a mandarin nursery tale filled with plum pudding, suspicious cheeses and greedy little boys gorging themselves with Celestial delicatessen.

Yet this is the story set in circulation two years ago by Mr. Thomas F. Millard and notwithstanding its absurdity, is now resurrected by The New York *American*, which assures its readers that it is in possession of facts proving that the British government is very active at this time in separating China from portions of its territory. The instrument in this up-to-date repitition of Germany's exploit in Shantung, is no less than the well-known British firm of Butterfield & Swire, who, according to *The American's* informants, has grabbed the foreshore of Amoy in South China, hoisted the Union Jack and taken possession in the name of King George. Regular old land grabbing stuff, which *The American* solemnly assures its readers is ample evidence of the existence and operation of the secret compact between Japan and Great Britain (unearthed by Millard) which gives to the latter exclusive domination in territories south of the Yangtze.

We have always sensed that "Taikoo" was aggressive and lived up to its motto (*Esse cuam Videri*), which worries every passenger who boards a China Navigation steamer for the first time. We know enough of its history to understand that the company will not meekly surrender without a stiff fight any commercial advantages it may have fairly won in ships, sugar or sundries, but we never suspected until reading *The American* that their legitimate acquisitiveness had expanded into land-grabbing for the glorification of the British empire. The story, vouched for, according to *The American*, by southern Chinese authorities, bore the earmarks of another phase of Chinese propaganda to stir up sentiment against British interests because of the alliance with Japan. The facts surrounding this "flagrant abuse of power against a poor, weak and defenseless people," were not difficult to obtain.

Away back in 1900, the British shipping firm of Butterfield & Swire (more familiarly known by its Chinese hong name, "Taikoo") obtained permission under specified conditions from the taotai of Amoy to erect what is known as a "flying bridge" or a pier connecting the island of Amoy with the hulk of the China Navigation Company moored in the harbor ; purely a commercial accommodation to facilitate the loading and unloading of cargo, a permit such as the average steamship company has to obtain in any port in the world to erect a wharf or other special facilities for its exclusive use. For ten years this structure served the purpose for which it was erected, but owing to deterioration and damages suffered as the result of a heavy typhoon, the pier became unsafe, a menace to life and property. It was decided to demolish it, but "Taikoo" with an experience of half a century in dealing with Chinese officials, before doing so, followed closely the rules prescribed for such cases by writing to the British consul of their purpose, who, in turn, officially communicated with the taotai.

The Chinese official acknowledgement is characteristic. After acknowledging receipt of the consul's letter setting forth the intention of "Taikoo" to demolish the pier and rebuild it at a later date, it concludes by stating that the maritime sub-prefect had been instructed to take note of the matter. The Chinese official did not give notice that the reconstruction of the pier would be opposed, so the note constituted a practical and legal acquiescence in the proposal and was so interpreted by the British consul at that time.

Before they could get around to the rebuilding of the pier, the war broke and it was not until last year that the firm was again in a position to proceed with its plans. Work was started on the new pier last spring, when the Chinese authorities issued a public notification opposing its construction, equivalent to an official boycott and a threat to punish any laborer who might work on the pier. Apparently, there are no two sides to the case. The British firm have an understanding with the Chinese government which the latter is attempting to abrogate. The great land-grabbing incident, brought to light by *The American* in order to give reality to Millard's bogey, reduces itself to an attempt on the part of the Chinese authorities to repudiate undertakings given by their predecessors. As "Taikoo" has acted all through in good faith and in full accord with the prescribed rules, it is not surprising that the British government is now firmly insisting that the Chinese live up to their obligations. This seems to be all there is to the story, the awakening from the nightmare conjured up after reading the editorial in *The American*.

* * *

Beans and Japan's Breakfast

IT is not often that statesmen publicly advertise a particular section of the world in advocating a more general use of its products. In the speech of Mr. Winston Churchill in London on September 28, on the breakdown of markets and purchasing power, he invited attention to the great possibilities of the humble soya-bean, a product of Manchuria, now recognized as one of the world's great staples. "It is a matter of the highest importance," he said, "that the West should learn the lesson of cheaper standards of living which is taught them by the peoples of the East in the adoption of the soya bean as an article of food. Given the existing situation on the continent this is the only real solution of the problem of reconstruction."

He went on to say that in a statement made to *The Times* Vienna correspondent by Dr. Berozeller, a young Hungarian who is experimenting with soya as a food, Berczeller professed to have succeeded in creating three kinds of foodstuffs from the soya bean, namely, bread, flour and milk in which the biological factor had been taken into account, and it is like "manna."

The bread is the cheapest on the market and is very palatable, and easily digested while the "manna" milk is very similar to cow's milk at one-sixth of the cost.

The doctor suggests that these foodstuffs are suitable for use in combatting the famine in Russia owing to their cheapness, compactness and the speed with which they can be produced, while the diffusion of these foodtsuffs would lead to the permanent cultivation of the soya bean in the Ukraine which would be important in the future provisioning of Europe.

It has long been known that the soya bean cake contains a large percentage of nutriment sufficient to be used more generally as food for human beings. Instead of being used for this purpose, it finds its way to Japan and South China as fertilizer. A market for its use as cattle-food was created in Europe before the war.

but this seems to have fallen off. The output of the bean mills along the line of the South Manchuria Railway for the fiscal year 1919 was 1,462,000 tons of bean cake valued at Y.99,800,000 and 151,000 tons of bean oil valued at Y.22,650,000. In the same year 19,693,000 piculs (1,158,000 tons) or 79 per cent. of the total output of bean cake went to Japan.

Japan's staple rice crop depends to a large extent upon the uninterrupted supply of this cheap fertilizer, and when this fact is understood, considerable justification is seen in a policy directed towards preserving ready access to a commodity, without which, her very life would be jeopardized in the event of serious disturbances in Manchuria or the possibility of China prohibiting its export or in other ways obstructing trade by the imposition of extra taxation. Japan, unlike Boston, may not eat beans for breakfast, but without the beans, the breakfast or her masses would suffer a marked decrease in their favorite food. In the event that Japan's rice crop should fail or become insufficient to satisfy the demands of a rapidly expanding population, a crisis may arise when the Manchurian "manna" may save the nation from starvation.

It is true that the argument might be stretched to cover China, but in this country famines, due to crop failures, are made possible because of the lack of transportation facilities which prevent supplies from other sections being rushed into the stricken areas.

* * *

The Port of Kobe

JAPAN is determined to protect her good name against the repeated accusations of practicing underhand discrimination against the trade of other nations. The phrase "discrimination so subtle that no proofs can be obtained" has struck home, and revealed to Japan, more than anything else, the full extent and enormity of the secret campaign waged for several years for the purpose of discrediting, and in the event of hostilities, exposing her to the enmity of the whole world. In our last issue we invited attention to the immediate action taken by the South Manchuria Railway Company to preserve its good name when the situation was explained to the president at a dinner given in his honor at Mukden. Special agents of the railway are now stationed at Mukden, Newchwang, Changchun and Antung, whose duty is to investigate and correct at once all complaints that may be brought before them.

In our September number, we also revealed something of the campaign to discredit the port of Kobe based on complaints of discrimination against foreign shipping during the war. Here again, we find the Japanese authorities keenly alive to the danger to national prestige involved in further misunderstandings of their management of the port. To cope with this menace to international goodwill, the prominent business men of Kobe have organized the Kobe harbour investigation committee.

In his speech at the opening session of this committee, Governor Ariyoshi pointed out that, notwithstanding the fact that the port authorities were always impartial in allocating the use of buoys and harbor facilities, certain foreign steamship lines are inclined to believe that preference is invariably given to Japanese steamers. The purpose of the commission was to dispel such misunderstandings and convince foreign shipping interests of the fairness of the port administration. This, he added, was indispensable for a bigger trade and a greater port of Kobe.

One of the difficulties in the present administration of the port arose from a conflict of authority on the part of three different government offices, the harbor police, the customs and the port office, all working independently of each other, and with offices situated in three different section of the city. The steady growth of the trade of the port, increasing from a tonnage of 2,903,732 with a value of Y.377,298,537 in 1911 to 4,486,013 tons valued at Y.1,646,564,087 in 1920 called for a huge expansion scheme in the area of the harbor, with wharves, warehouses and other terminal facilities. The present area of the harbor (approximately 2,200,000 *tsubo*) is to be increased to 3,450,000 *tsubo* provided the scheme is approved by the commission.

Naturally, with such an immense undertaking before them, involving the expenditure of many millions of yen, the authorities are awake to the necessity of maintaining the reputation of the port at a high standard. The creation of the Kobe harbor investigation commission, must be accepted as an effort on the part of reputable Japanese interests, backed with the full support of their government, to do away with such misunderstandings as culminated last year in an official denouncement of the port in a letter from the American secretary of commerce to the chairman of the United States shipping board. The personnel of the commission is a guarantee to foreign shipping interests that such misunderstandings are a thing of the past, that Kobe welcomes and is prepared to make considerable sacrifices in order to hold the good will and friendly co-operation of all foreign interests.

* * *

The Boxer Indemnity

IN discussing Japan's policy towards China with one of the highest officials in the present Japanese government, he frankly admitted that Japan would not be adverse to remitting her share of the Boxer indemnity, either in whole or in part, if an opportunity presented where it could be done without creating misunderstandings. He said that if Japan was to surrender her share of the indemnity under an agreement with the Peking government, the South and anti-Japanese foreign interests, would denounce this purely friendly act as another attempt to purchase the North and support it against the South by underhand financial assistance, and be construed as a violation of the consortium understanding, so, no matter how unselfish Japan might be in this matter, nothing could be done until a united government was firmly established in China.

The desperate financial condition of China has provided the opportunity for a concentrated campaign in foreign countries for the total remission of the Boxer indemnity following the precedent set by the American government to have the funds employed for educational purposes. Feeling that the benefits accrueing to American trade and prestige in China through the remission of the indemnity, has placed British interests at a distinct disadvantage, a movement has been initiated to influence the British government to adopt this practical method of demonstrating its friendship for China. Naturally enough, the Chinese minister to Great Britain, Dr. Wellington Koo, seized the occasion to further a campaign, that, if successful, must win for him the undying gratitude of the Peking government.

Addressing a convention of Chinese students at Swanwick, near Derby, Dr. Koo said that Great Britain was one of the best schools for training leaders of men, and the presence of more Chinese students would be of mutual far-reaching benefit. It would make the two nations understand one another better, and facilitate the rapidly gowing intercourse between the two peoples.

"Each Chinese student educated in Great Britain was not merely a sure consumer of British goods, but also a rallying centre for them. Intuitively he would prefer to place his orders for foreign goods with the manufacturers of the country he knew best."

"The practical question how more Chinese students could be encouraged to come to Great Britain brought him to the question of the Boxer indemnity. The annual instalment still due to Great Britain, including principal and interest, was about £400,000, and there were twenty-three more instalments to pay. The unpaid

portion would provide China with means of sending one or two hundred students here every year."

There is little doubt that in the long run British trade and prestige in China would receive a great stimulus as a result of the remission of the British share of the Boxer indemnity, but with the present feeling in Canton, such an act of friendship would be construed as a covert attempt to bolster up Peking at the expense of the South. The viewpoint of Japan would seem to cover the situation from all angles. The greatest benefits to China as a whole from the remission of the indemnity, can come only through a united country, the establishment of a stable government having the support and confidence of the entire people.

* * *

Engineers All

"We, the Presidents of the four American National Societies of Civil, Mining, Mechanical and Electrical Engineers, on behalf of our Councils, send you our good wishes. We have instructed our representatives attending the Conference in London on June 29, 1921, to express our feeling of brotherhood and our deep sense of loss in the death of so many of our British colleagues on the battlefield. The soil beneath which they lie will always be sacred in the eyes of American engineers. We record here our sense of obligation to the naval engineers and constructors whose work enabled the British Navy to keep the sea as the first line of defence. We of America rejoice that we were permitted to share with the engineers of Belgium, France and Italy and with the men of our own blood the final victory over a war spirit dangerous alike to the rights and happiness of men. We glory in the memory of having stood by your side in battle, a guarantee to people of the British Dominions that the American Union will be always ready to give themselves in a like cause. With our greetings we pray that the engineers of all nations may dedicate themselves anew to justice and peace and to the service of humanity in a better and nobler fashion. We beg of you to accept this expression of esteem and goodwill as the voice of your colleagues and brothers of America."

IN the above glorious words the four great American engineering societies paid tribute to the engineers of Great Britain, France, Belgium and Italy on the occasion of the last conference of the Institution of Civil Engineers. It breathes the true spirit, the sentiment of broad-minded, big-hearted men upon whose shoulders fell the brunt of keeping the war going to its victorious conclusion, words of heartfelt appreciation of the immense sacrifices on the part of British engineers that made victory possible.

It is in this spirit that THE FAR EASTERN REVIEW has taken up its post-bellum work in China, where, more than in any other place in the world, the British and French engineers have suffered for their contribution to the cause of civilization. For six long years they were deprived of a market created largely through their initiative and investments. American manufacturers of engineering products were the beneficiaries of this sacrifice.

It is natural that American firms should desire to hold their war-won position, but we maintain that no undue advantage should be taken at this time to hamper the efforts of the British and French engineers to re-establish markets created through their pre-war activities. The entire world owes a deep debt of gratitude to British engineers, who, having fulfilled their duty, re-enter the the competition in China, asking nothing more than a "free field and no favor," on one hand, and on the other, a modest request that China complies with past committments in giving their products a preference in such few instances where their capital and enterprise have created the demand.

THE FAR EASTERN REVIEW echoes the message of American engineers to their colleagues in Great Britain, and looks forward to the time, not far distant, when this sentiment will rule in China.

* * *

The Kiangsi Railway

AS the time draws near for repayment of the $7,500,000 advanced by the East Asia Company to the Kiangsi Railway Company (a provincial concern operating the line from Kiukiang to Nanchang), considerable alarm is being manifested in Chinese circles because of the company's inability to meet its obligations. These fall due in May 1922, and according to the loan provisions, if the interest and principal are not paid on that date, the Japanese company is at liberty to take over the administration and operation of the line. Recently, Mr. Tsai Ju-kai, former civil governor of Kiangsi, was elected managing director of the railway. He then proceeded to Peking to enlist the support of the government in repaying the debt. The railway ministry was willing enough to take over the responsibility, but in view of the empty condition of the treasury and the demands upon the railways for funds to run the government, as well as the prospect of meeting the amortization payments due next year on other railway loans, this plan had to be abandoned. If no other solution offers, the Kiangsi Railway Company, it is now reported, will negotiate another loan from the Japanese for the extension of the line to Kwangtung and Foochow, because its present length is too short to make further operation profitable.

Here we have another complication, that on the surface, was meant to be dealt with by the Consortium, but as the East Asia Development Company is not included in the Japanese Group of banks, and consequently not a party to the Consortium, it will be at perfect liberty to proceed with such a transaction.

On the same principle that other lines have been excluded from the scope of the consortium, as coming under the heading of those on which substantial progress has been made, the Kiangsi Railway Company, a provincial and private Chinese corporation, is also at perfect liberty to negotiate with the Japanese for the financing of the extension of the line originally included in their provincial charter. The complication involved in this goes further, as the contract for financing and construction of the lines from Nanchang south to Canton and Swatow, was promised by Peking to the British firm of Pearson & Sons. Any attempt on the part of the Chinese to raise a new loan to repay the old one to the Japanese company, and provide funds required for the proposed extensions, will be hailed by other interests as an attempt on the part of Japan to push her influence deeper into this part of China. Yet a careful analysis of the situation reveals that this seems to be about the only thing the Japanese can do in order to protect their original investment, in the same manner that others are forced to provide new loans to Peking in order to liquidate old ones. The development of the Kiangsi railway question will be interesting to follow.

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International Bank Man as Japan's Adviser

WE learn that the Japanese foreign office has appointed Mr. Dallas McGrew as adviser for American affairs. Mr. McGrew is from the International Banking Corporation, and was at one time a consular officer in Japan. He is the son of a missionary, born in India and married a daughter of the late Richard Watson Gilder, for many years editor of the *Century Magazine*. Mr. McGrew is a Harvard graduate, and one of the pioneers of the movement for a better understanding between the United States and Japan.

Photo by Rembrandt

Left to Right—P. G. Hornell, representing the Chinese Chamber of Commerce ; Dr. Isamu Hiroi, of Japan ; F. Palmer, British member ; Major-General W. M. Black, American on the commission ; L. Perrier, representative of France ; P. Ott de Vries, Netherlands representative ; H. von Heidenstam, member ex officio and Engineer-in-Chief of the Whangpoo Conservancy Board.

The Port of Shanghai

SHANGHAI is indeed fortunate in having the advice of the world's foremost river and harbor experts to consider and advise upon the needs of its harbor. Whether Shanghai is to drop to the level of a second rate port or retain its position as the commercial door to Central China is a question this commission is now called upon to decide, a question that touches vitally the interest of every firm and property holder in the settlement and especially those pioneers whose private initiative is largely responsible for its present prominence.

It is not alone the engineering difficulties, but financial, commercial and above all, political obstacles will have to be met and surmounted. The engineering end of the harbor scheme will probably be met with in some proper feasible manner once a decision is made as to what is to be done. Before this however, the commission will be faced with reaching a decision of what, in their opinion, will be the depth of water necessary to handle the future ocean tonnage of the port. If Shanghai is to take care of the largest type of ocean carrier with a draft of 35 feet and over, then the engineering end becomes a question of either dredging the Fairy Flats, training the Yangtze to keep its channel open, or constructing an entirely new express port somewhere on the north shore of Hangchow Bay, where a depth of 35 feet and over can be found and maintained without undue expense. These various schemes were fully described and illustrated with plans in the June number of THE FAR EASTERN REVIEW.

Naturally enough, foreign interests of Shanghai who have contributed so largely to its development from a mud flat to the premier port of China, and many of whom are interested in medium sized ocean steamers, would prefer some plan whereby the Yangtze approach could be maintained, and the new port constructed in close proximity to and forming a part and extension of the present harbor system. Having in view the political difficulties with the Chinese authorities surrounding the construction of a new port on Hangchow Bay, where it may be taken for granted that all property rights would be held by Chinese, and at excessively high figures with the gradual deviation of warehouse and allied business to this new centre, vested interests in Shanghai must cherish the hope that some way will be found to retain the Yangtze estuary as the entrance to the port, even at a higher cost, which in the end, would be saved in demurrage and other fees and expenses incurred in the delays in entering and leaving the port.

Whatever the cost, it may be taken for granted that the trade of Shanghai must foot the bill in the same manner that the Whangpoo conservancy work has been so successfully financed. The Chinese government or the other Yangtze ports will never contribute directly to the development of Shanghai's harbor. Yet if the findings of the commission favor the retention of the Yangtze approach, then the whole question of the Yangtze conservancy from the gorges to its mouth, should be taken in hand. If, like the Mississippi, the Yangtze is to be trained to scour out and keep open its own channel, the improvements that will make this possible, may have to be carried far up the river in accordance with a carefully devised general program. Here, enters the old, old story of finance. With the experience of Chinkiang and other ports on the river, it seems almost hopeless that the Chinese government will make any move to provide necessary funds unless influenced by strong pressure from the other nations.

Yet any plan for the improvement of Shanghai's harbor must be based on its relation to the whole Yangtze Valley trade. It is not a local question; it rises above a purely Chinese problem into one of international importance. It is safe to predict that the Chinese government will not enthuse over any plan which might involve the training of the entire Yangtze, nor look with favor upon any extension of the present settlement limits for the construction of a new harbor in the lower Whangpoo. A Greater Shanghai sounds well on paper, but further growth must of a necessity conform to Chinese ideas, which, at the present time, seems set in opposition to any further encroachment on their sovereignty. So it would appear that quite apart from the engineering problem, the commission has to face a most delicate political one, in which the question of sovereignty and finance will assume greater and greater proportions.

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Development of Japan's Railways

THE fiftieth anniversary of the opening of Japan's railway service was celebrated in Tokyo on October 14th. The crown prince attended as the representative of the emperor, while the imperial princes, the diplomatic corps, the cabinet and more than 3,000 guests gave eclát to the occasion. After the crown prince had delivered a speech of congratulation on the faithful services of the railway officials and employees, the premier, railway minister and others followed with appropriate speeches.

The Development of Japan's State Railways

It is a fitting time to review the splendid progress made by Japan's railways during the last fifty years, and this can properly commence at the time the lines were nationalized.

The railway nationalization law in Japan was drawn in March 1906; and the acquisition by the state of the principal private railways was completed in October the following year. The main purpose of the nationalization was of course the unification of the system, the efficient operation and thorough control by one vast and powerful monopolistic hand namely, the government, such as was thought essential from the beginning in view of the inherent nature of this particular branch of public utilities.

Reorganization Under State Control

The state-owned railways, prior to the nationalization, were operated on the departmental system based on the principle of centralization. This worked tolerably well, inasmuch as the management then was a relatively small affair. At the time, however, the government assumed the control of the principal railways in 1906-1907, the centralization system was found inadequate and a reorganization was at once started. In December, 1908, the government railway bureau was removed from the control of the minister of communications and assigned to a newly created body, the railway board, which was made responsible directly to the prime minister of state for all matters relating to the operation of the state-owned railways as well as to the administration of private railways. The control was then decentralized, the whole system being divided into five jurisdictions, each of which had a directory of superintendent established.

The central administration was also materially changed. A further reorganization was introduced in 1910. The traffic and finance departments were reorganized out of existence, the chiefs of the various sections being brought into direct touch with the president.

In 1913, the finance and traffic departments were re-established with a view to ensuring uniformity of operation in the central administration. The work at headquarters was divided into two parts—technical and business. Technical affairs were placed under the charge of the director of the technical department while all business other than technical matters was apportioned among the president's secretariat, the private railway administration, the traffic and the finance departments. The principle of centralization, which was dominant in this revision, also placed the purchase and distribution of railways stores and supplies in the hands of a newly created officer, the controller of general stores, while the workshops were taken out of the control of the divisional superintendents and brought under the immediate control of the director of the technical department.

In June 1915 the central administration again underwent reorganization, whereby the local branch stores and the workshops passed again to the control of the divisional superintendents. The sections abolished in the previous revision were restored.

More complete reorganization and decided administrative change, however, were still waiting. In May 1920 an imperial edict was promulgated raising the position of the imperial government railways to a governmental department with a minister as its chief executive head. The railway minister, the newly appointed official, is a member of the cabinet, and is directly responsible to the throne. The duty of the railway minister is defined to be: to supervise the state-owned railways and the businesses connected with them and to administer, for the private railways and tramways. In addition to the above he is charged with the duty of administrating for the businesses connected with the operation of railways and steamer services of the South Manchurian Railway Co, Limited. The six departments (henceforth to be called bureaux), namely those of private railway administration, traffic, construction, engineering, mechanical engineering and finance, are still retained in the central office, while the number of the divisional superintendence offices are same as before, that is, six, comprising Moji, Kobe, Nagoya, Tokyo, Sendai and Sapporo divisions.

Finance and Capitalization

The finance of the state-owned railways prior to the nationalization was included in the general imperial budget, so that any balance accruing was to be turned over to the general account of the government treasury, and all the expenses for extension and improvement were met with by loans or taxation.

This accounting system was modified in 1906, and the new method was put into force from the fiscal year 1907-8, when a new regimé came into being with the suddenly expanded business of the railways, in consequence of the state acquisition of the seventeen private railways.

The capital of the state-owned railways at the time of nationalization, that is, on March 31, 1907, was estimated at Y.189,-966,470. During the two years 1907-8 and 1908-9, the government paid Y.483,565,325 for the 17 purchased railways. Then big funds were subsequently disbursed upon new extensions and the improvement of the existing lines, in order to provide facilities adequate for the growth of traffic and for fulfilling the grand object of the nationalization. In consequence, the investments at the end of the fiscal year 1916-17 rose to Y.1,108,060,237, which means an increase of Y.354,173,249, or 47 per cent., as compared with the end of the year 1908-9, or the year when the account was completely settled for the purchase of the private railways.

The latest figures, that is, those of the fiscal year of 1919-1920, are given as Y.1,385,370,000.

Operation of State-Owned Railways

The actual conditions of the operation of the state-owned railways may be inferred from the following figures, which are taken from the statistics of the two fiscal years, those of 1913-1914 and 1919-1920:—

Item	Year 1913-14	Year 1919-20
Area (square miles)...	129,247	129,247
Population	53,362,682	56,667,771
Total miles of main track worked (m. ch.)	5,470.71	6,202.26
Total miles of all tracks (m. ch.) ...	8,323.22	9,745.10

Item	Year 1913-14	Year 1919-20
Average area per mile of line (sq. m.)	23.6	20.8
Average miles of line per 100,000 of population	10.3	10.8
Average miles of line worked:		
passenger traffic	5,298.0	6,056.8
goods traffic	5,344.3	6,133.3
Number of stations...	1,529	1,776
Capital (yen)	973,091,496	1,385,370,000
Working revenue (yen)	113,477,055	310,330,370
Working expenses (yen)	54,551,246	202,816,792
Profit (yen)	58,925,809	107,513,578
Percentage of profit on capital ...	6.1	7.8
Balance (surplus) (yen)	19,794,315	59,886,096
Profit per train mile (yen)... ...	1.03	1.40
Locomotives...	2,500	3,121
Passenger carriages...	6,453	7,450
Goods wagons	42,705	51,065
Employees	112,087	158,807
Monthly compensation of employees (yen)	2,109,271	4,413,485
Number of passengers carried ...	167,773,143	357,881,989
Number of passengers carried one mile	3,690,964,619	7,942,712,144
Average number of journey per capita of population	3.1	6.3
Tonnage of goods hauled	36,348,362	59,903,957
Tonnage of goods hauled one mile	3,053,852,638	6,294,060,079

As regards the number of passenger carriages, which were 6,453 in 1913-14 and 7,450 in 1919-20, an increase of nearly one thousand, it may be remarked that the use of them in recent years has become more frequent and full, as will readily be seen from the comparison of the number of passengers carried in these two fiscal years given in the figures, 3,690,964,619 for 1913-14 and 7,942,712,144 for 1919-20. The unusual increase in the traffic has of course been caused by the conditions created by the European war. Similar remark also holds true in the case of the tonnage of goods hauled, which increased from 36,348,362 in 1913-14 to 59,960,957 in 1919-20, inspite of the number of goods wagons which was increased only from 42,705 in 1913-14 to 51,065 in 1919-20. The rates of working revenue and expenses have also increased out of proportion, as will be seen in the figures Y.113,499,055 of revenue and Y.54,551,246 of expenses for 1913-14 and Y.310,330,370 and Y.202,816,792 respectively for 1919-20. The cause of the increase of expenses is due to the advance of cost of materials and wages. The deficit has been covered partly by the increased traffic, making the comparatively small number of rolling stock serve greater end as already remarked. But in order to make both ends meet completely, it was necessary for the government railways to increase fares and rates. The fares were raised twice, 25% in 1918 and 27% in 1920, and the rates once, 20% in 1918. The increase in the number of employees from 112,087 in 1913-14 to 158,807 in 1919-20 has been partly due to the adoption for some class of workers of standard working hours which resulted in the shortening of individual hours of service, and partly to the growth of traffic.

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China at the Pacific Conference

It is very often that criticism of any measure mooted by responsible or irresponsible parties brings into public focus and, therefore, public prominence, something which, because of its absurdedly ambitious or preposterous nature, were better left to fade into inconspicuous decline and die. There is grave danger that a discourse on the subject of this editorial may bring to it that which its sponsors no doubt desire, viz., sufficient publicity to make of it a matter that must command the attention of the great body that is assembling at Washington for the discussion of international affairs. While sensible to this possibility, sight is not lost of the fact that to waive the matter as inconsequential might be taken to mean a mute acquiescence, influencing a concourse of judges to a settlement totally undesirable. And there is no question but that the document printed in the *Peking Leader* as received from the Washington conference China aid association, in which is set forth what is claimed to be the agenda of China at the Pacific conference, is deserving of condemnation. It is the purpose of this article to make it clear beyond doubt that the average foreigner in China, the man who has given any thought to the matter at all, does not countenance any proposal to remove such privileges as he at present enjoys under the laws of extraterritoriality, not because he would wish to partake of rights unfairly obtained, but for the reason that to place himself under Chinese jurisdiction until such time when the Chinese may properly administer justice would be tantamount to suicide. The danger of giving undue publicity to this matter is therefore accepted, the danger of ignoring it being the greater. With the main items of this proposed agenda there is no need here to discuss for the Pacific conference may safely be left with matters which, because of their international nature, are already matters of intelligent consideration, but there are three items which demand very succinct and immediate attention. They are:

(1) That the garrisons of foreign countries stationed along the railway line between Peking and Shanhaikuan be withdrawn.

(2) That the garrisons in the legation quarters at Peking be withdrawn.

(3) That the foreign concessions in China be restored and opened, through her own initiative, to foreign commerce.

To point the finger of scorn and ridicule at nearly all Chinese initiative does not require excessive effort, and, in doing so, it may safely be stated that the desire to hurt is never present, for there is no foreigner in China who thinks at all, and has any real feeling for the country and its people, who is not fully cognizant of their greatness in many aspects of existence. If, therefore, China's icnompetence is now emphasized, let it be understood that the fact creates the necessity, more especially when this incompetence desires to endanger the real welfare of international trade in the country.

The forces of lawlessness and disorder in China, so prevalent as a result of indiscriminate militarism endorsed and encouraged by the handful that guides and controls the country, compel the garrisoning of the railway between Peking and Shanhaikuan. This is very generally conceded when the terrible experience of 1900 is remembered. And the maintenance of garrisons in the legation quarter of Peking is similarly necessitated. Experiments have proved that Chinese can be trained into first-class policemen and soldiers, disciplined beyond the possibility of criminal excesses, provided food and proper care are accorded. It is not to be wondered at that looting is perpetrated when food, and wages cannot be obtained in any other way. With leaders whose concern is centred neither on country nor people, whose greed permits the wildest type of looting so that unpaid soldiery may remain satisfied and subservient, it is no wonder that discipline in China is of the type at the present time that no self-respecting foreigner can possibly submit to, and this is what our unthinking friends who have framed this agenda for the Pacific conference would have us do. Let the leadership of the country first of all place itself beyond the pale of suspicion as to intent and purpose, then produce a force which will guarantee full protection to the lives of all foreigners and their property, instal a ministry of justice that will dispense law faithfully and sincerely, and nearly every foreigner in China will welcome the abolition of extraterritoriality. China may safely be assured that foreigners do not oppose it at the present time through mere whim or prejudice. Her many well-wishers look forward to the time when her strength and competence will warrant a reversal of present relations but it is plainly evident that the time is not ripe, and while the hope that a change

may transpire in this relationship in the near future, there is no indication whatsoever that effort other than selfish will make a transference possible for many years to come. Of course there are patriots in China, and it is pleasing to note a steady increase of them, but until their patriotism courts real sacrifice and not the furnace warmed eloquence that emanates from the safety of the treaty ports, there will be very little headway made in the direction most desired.

This leads to the third item mooted for discussion, viz, that the foreign concessions in China be restored and opened, through her own initiative, to foreign commerce. This is rather a tall order, as our friend the grocer would say, with, perhaps, a pleasantry overshadowing his features that must unfortunately be absent in the present instance.

With such strength behind her as would have made the advent of the foreigner and his influence impossible, even unto the present day, it cannot be questioned but that the magnificence of the imperial reign would have held sway over a country still absolutely agrarian, perhaps to China's benefit, although there can be no change where there is no effort, and it is believed that change stands for progress. But modern warships and artillery have prevailed, and now the spread of the foreigner's industrialism seems to be a foregone conclusion. That being so, and if China is to ultimately benefit as a result, it must be acknowledged that what has been built up as a direct result of his not altogether selfish effort, should remain the property of the foreigner. When the time comes that a China is established as will be able to properly conduct her relations with the foreigner on her shores, then it is not likely that the foreigner will make much protest if China wishes to take over her rights of administration and public property, provided, of course, that compensation which allows for loss of goodwill is adequate and fair. But as it stands at present why and for what purpose should these be handed over ? Such disorganization and questionable business practice would prevail as to guarantee bankruptcy of the ports within a very short space of time. Five thousand years of Chinese civilization cannot be upset so completely as to enable modernism a safe and progressive journey under Chinese guidance. It will take years of steady inculcation before the underlying principles of foreign business have been imbibed to the extent that will permit of safe and progressive Chinese control. This does not imply that the Chinese are slower to grasp at modernism than their neighbors the Japanese. On the contrary the Chinese possess an individual intelligence and shrewdness which perhaps excel those of the Japanese. Their one great failing is lack of cohesion, the joining of wit and wealth for the preservation of the state and its improvement. Did they possess this, and did they lose that shrewdness which borders closely on what, to the foreign mind, is technically illegal, they could be left with the reins of treaty port control in perfect safety. When there is conclusive evidence that both these factors have become a part of their make up there can be no just cause why China should not take over her own control as Japan did when extraterritoriality was dispensed with in that country.

The only possible good that can come of present time Chinese agitation for the elimination of extraterritoriality and all that stands for is that the task will be made easier when the proper time comes and for this reason only can the present attempt receive any support at all. To take it for what it is worth in this respect can have no harmful effect, but to accept the effort in any other light is to court disaster.

* * *

Japanese Engineers in England

THE city planning commission of Japan headed by Mr. H. Yamada with Mr. H. Shimizu and Mr. N. Iwata, both engineers of the municipality of Osaka, are now making a careful study of scientific development in municipal engineering in England and enjoying the rather unique opportunity of carrying out their researches under the personal guidance of the best British known experts, says the *Sanitary Record*, Japan is in the throes of development from an agricultural to an industrial country. The light transport of rickshaw and handcart is being rapidly replaced by motor cars and heavy traffic, which necessitate properly constructed, hard-wearing roads. In addition to this development the country is suffering from a housing shortage similar to that experienced in England. With the thoroughness so common to the Japanese, these gentlemen are investigating every phase of city and town development, viz., underground railways, roads, housing, sewage, disposal of refuse, etc. They have seen the whole of the working of the underground railways of the city of London, and from that proceeded to the details of the special construction of roads in the city, illustrating the uses of asphalt, wood paving, and other special surfaces necessitated by the extraordinary weight of traffic to be dealt with. Thanks to the interest shown by English borough and highway engineers, they have been afforded an opportunity of closely studying the latest methods adopted in regard to sewage and refuse disposal. Much interest was shown in the Hornsey plant, where Mr. Lovegrove, the borough engineer, has brought the art of utilizing waste products to an extraordinarily high standard. During their visit many miles of country roads were covered, and in these investigations they were accompanied by Mr. Pitts, of Messrs. Aveling and Porter, Limited, the well-known Rochester firm, whose connection with the machinery and plant for roads has extended over a very great number of years, and thus secured close technical advice which should prove of considerable benefit in the selection of schemes eventually adopted by Japan. The Japanese delegates will proceed to the cities of Glasgow, Edinburgh, Manchester, Leeds, Liverpool and Birmingham. At the latter city, Messrs. Lever Bros. will afford them an opportunity of visiting the model town which that firm has erected at Port Sunlight.

* * *

Japan Retires Own Obligations

ONE of the most notable features of the bond market in Europe and New York has been the steady, quiet purchasing of Japanese securities for the account of the Japanese government. Nearly $32,000,000 (gold) par value of Japanese sterling obligations have been retired since January first at a substantial profit to the Japanese government, owing to the fact that sterling exchange has been depreciated to a level where the Japanese could buy a pound sterling with Y.7½, compared with Y.9¾ at par. Japan issued the bonds fifteen years ago at par and is now buying them not only at a depreciated exchange price but at a low market value. The total purchases aggregate £6,352,140, of which £2,739,000 are of the 4½ per cent. issue, and £3,613,140 of the same bonds of the second series, leaving £18,420,879 of the first series outstanding, and £19,903,940 of the second series. The original amount of each series issued was £30,000,000 marketed in London, New York, Berlin, Frankfort-on-the-Main and Hamburg in 1905.

The 4½ per cent. bonds are secured by the tobacco monopoly, the revenues from which over a long period have been from $30,000,000 to $40,000,000 annually. The first series bonds are a first charge upon this monopoly and the second series bonds are junior in lien.

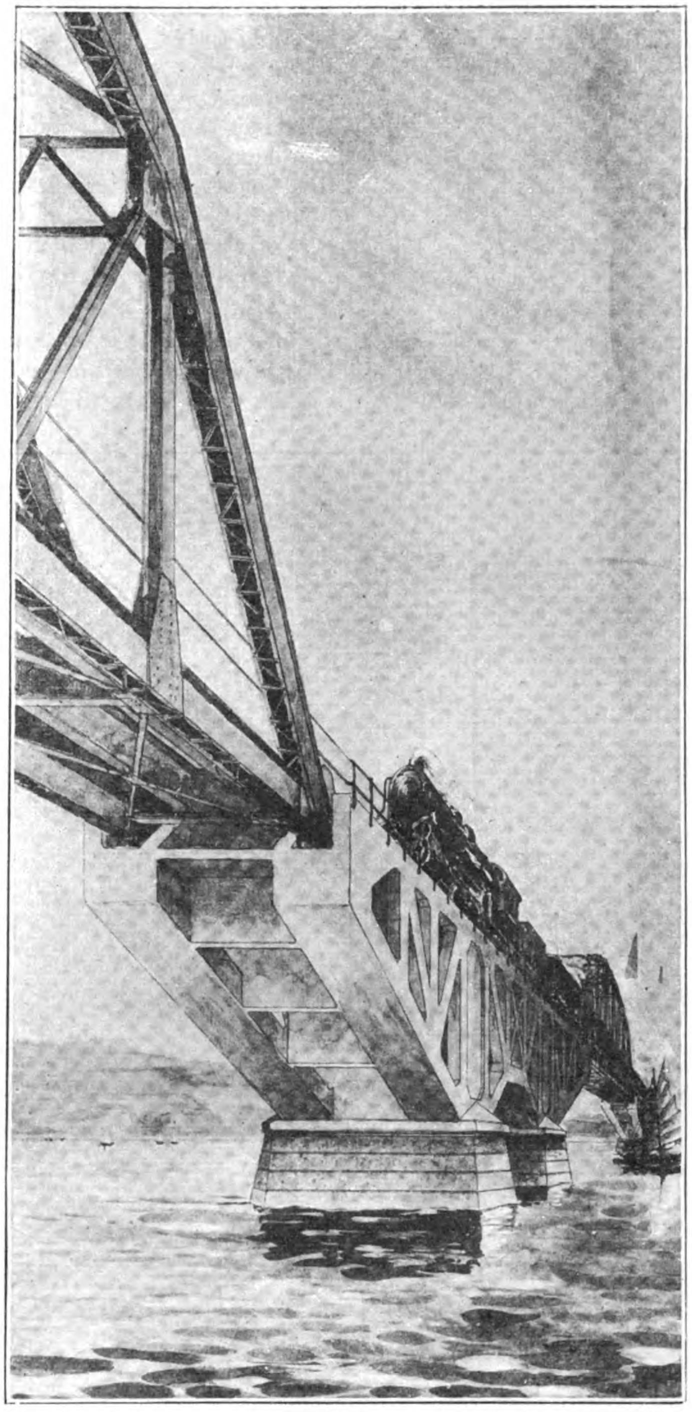
Both series have had a remarkable advance since January 1 on the New York Stock Exchange.

When Japan joined the allies in the war against Germany payment of interest to citizens in Germany was stopped. However, such coupons were redeemed when smuggled out of Germany and brought to the New York branch of the Yokohama Specie Bank, Ltd., regardless as to whether the coupons bore the German stamp. There is a clause in every bond protecting the rights of citizens of every country who hold the bonds in the event of war with Japan.

Reinforced Concrete Railway Bridges

THE Yellow River bridge competition, amongst other things, has contributed greatly to a more intelligent understanding of Chinese engineering problems by advancing ideas from all schools and providing material for discussion for some time to come. Perhaps one of the most interesting phases of the competition was the entrance into the Chinese bridge-building field of the reinforced concrete engineer with his radical ideas overturning recognized standards and creating new precedents in all countries. Numerous reinforced concrete railway bridges have been erected in all other parts of the world except China. In this number of THE FAR EASTERN REVIEW will be found the illustrations and descriptions of several such structures erected by the Netherlands East-Indies States Railways at important points on their Java lines. In Indo-China are found many examples of the best work of the reinforced concrete engineer, from railway and road bridges to buildings, piers, markets, warehouses, etc. It was natural that the reinforced concrete engineer should make his presence felt in such an important competition as that of the Yellow River bridge, and it was also natural that the firm responsible for the most audacious reinforced concrete construction in Indo-China would be prominent in this competition.

We were not surprised therefore to learn that the French firm, "Etablissements Brossard Mopin," who have been so successful in Indo-China and the Straits Settlements had entered the Yellow River bridge competition submitting two designs for cantilever reinforced concrete piers supporting the steel superstructure, and, in addition, three designs with reinforced concrete superstructure for the north end of the bridge where the river is practically always dry. This, for the purpose of cutting down the construction and maintenance expense of an all steel structure.



Design of Cantilver Reinforced Concrete Piers Supporting the steel Superstructure, Submitted in the Yellow River Bridge Competition, by the French engineering firm of Etablissements Brossard-Moppin (Bridge Engineer, Mr. Stanislas Kozierski)

Notwithstanding that the French engineer's estimates and calculations proved that this type of bridge was not only practical, but economical, the majority of the bridge commission ruled that such a novelty as reinforced concrete superstructure and cantilever piers cannot be applied for a railway bridge of such importance as the one over the Yellow River. The French engineers, however, hold to the contention that the adoption of reinforced concrete superstructure for the northern part of the bridge, over a river bed practically always dry, thus permitting erection without the risks attached to false-work, would materially lower the costs and at the same time realize a step forward in scientific bridge building in China. They also argued that the cost of steel work being very high, the economics of bridge building called for the adoption of solutions that would relieve China as far as possible from the high cost of imported steel and encourage the domestic Portland cement industry.

The enterprising reinforced concrete engineers had to rest content with the award of the prize of $25,000 for the third best design submitted. The Brossard-Mopin firm submitted six designs drafted in their Tientsin office after careful study of local conditions on the site of the proposed new bridge and thorough examination of the existing bridge. The general and detailed calculations and drawings were prepared by the firm's experts, and an arrangement was made with the United States Steel Products Company for furnishing the steel work for the 250-foot spans selected as most economical for designs No. 1 and No. 2 submitted by the French firm. The United States Steel Products Company furnished the calculations and drawings for the 250-foot spans, but all detailed drawings and calculations for foundations and piers and for general design of the whole bridge, including also the detailed and general calculations for steel work of Design No. 3 and for the reinforced concrete spans, were prepared solely by Mr. S. Kozierski, the bridge engineer of Etablissements Brossard-Mopin In an article on the bridge tenders published in the August number of THE FAR EASTERN REVIEW, it was mentioned that the French firm was acting for the United States Steel Products Company in the competition The above explanation will rectify this error.

In Mr. Stanislas Kozierski, the Brossard-Mopin firm have secured the services of an engineer who was assistant to Mr. M. J. Ciszewski, chief engineer of the Volga-Bougoulma Railway, and designer of the great 2,561 metre bridge at Simbirsk over the Volga, which was completed in 1916 at the height of the war, undoubtedly one of the great bridges of the world.

Bucyrus Opens Branch in England

The Bucyrus Company, excavating and mining machinery makers, headquarters at South Milwaukee, Wisc., U.S.A., and formerly represented in the British Isles by Messrs. G. F. West & Co., wish to announce that they have now opened their own office at 19 Iddlesleigh House, Caxton Street, Westminster, and henceforth all communications for them should be so addressed.

Gold in the Philippines

By *WARREN D. SMITH*

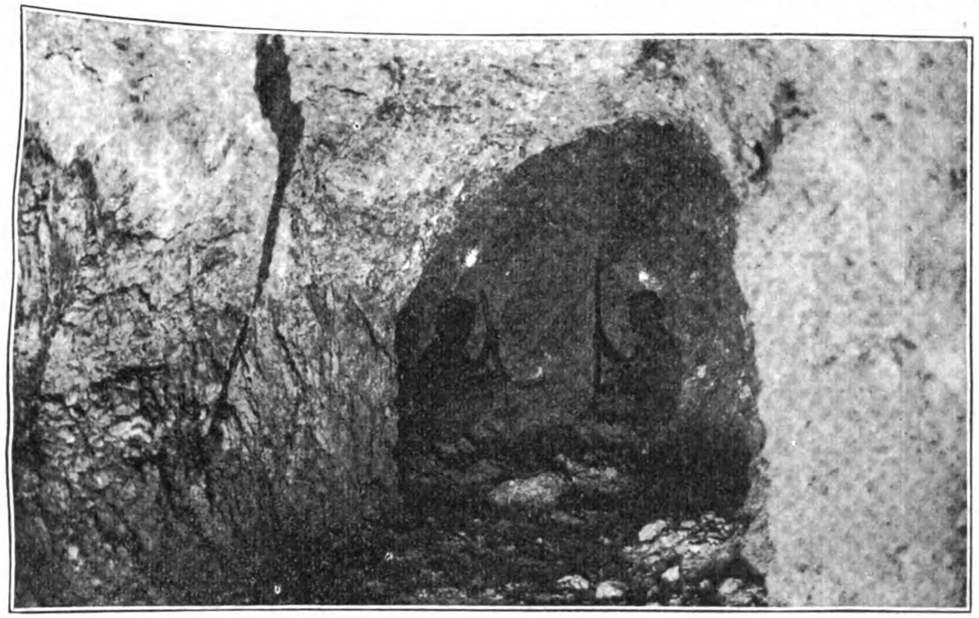
Acting Chief, Division of Mines, Bureau of Science, Manila

OF the three basic industries—mining, agriculture and forestry—the tripod directly supporting our material civilization and indirectly our whole physical, intellectual, and moral life—the first has been the most tardy in development in the Philippines. This is unfortunate, for, had it received greater encouragement and not, in some instances, discouragement by the imposition of restrictive laws and taxes, the industry might now be yielding a larger revenue to the government and be the cause of the circulation of more fluid capital in the islands. Instead of this prosperous condition, we find a few struggling companies and a host of others which have died still-born. This backwardness in Philippine mineral development is due to several factors other than those named and the government cannot be blamed for all of it. It making what seems to be rather direct charges in the matter of the government's failure to support the mining industry to the fullest extent, I wish to say that this cannot be attributed to a lack of desire to assist so much as to other claims upon the support of the government and to the failure to realize the necessity of doing certain things which, to experienced mining men, appear to be self-evident. The department of agriculture and natural resources is showing that it has the welfare of the industry at heart by the recently proposed very liberal amendments to the petroleum regulations. As the writer is the main connecting link between the government and the industry, it is his duty to report the true status of the situation without reservations. In any of these shortcomings of the government, he does not wish to evade his share of responsiblity.

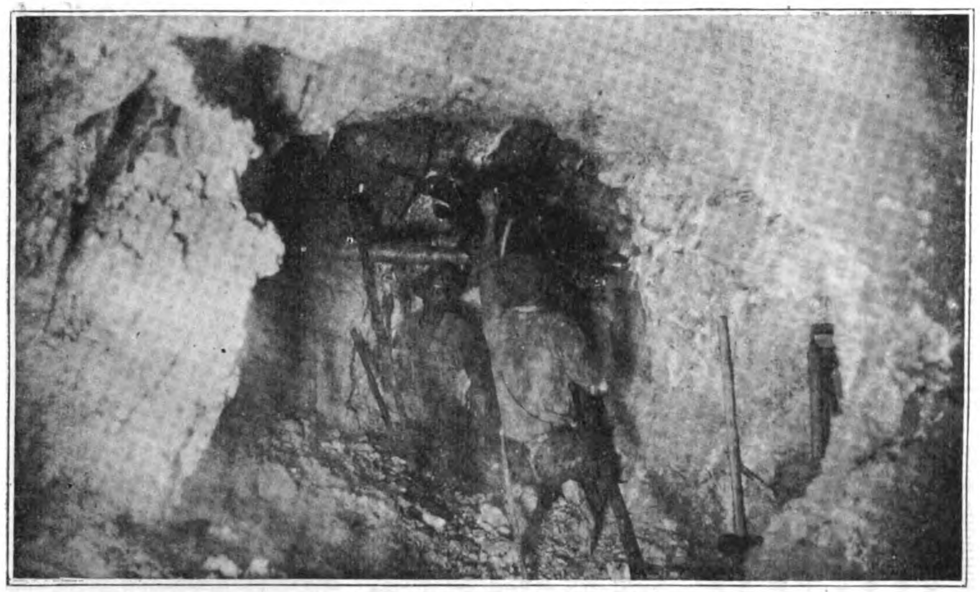
Again let me say that it is not so much what the government (I refer to both the American and Filipino governments) has done as it is what it has not done which counts. An example of what can be done is the recent bonus offered by the government of

General View of the Plant and Cottages of the Benguet Consolidated Mining Company at Autamok, 5 miles from Baguio, the Philippine Summer Capital

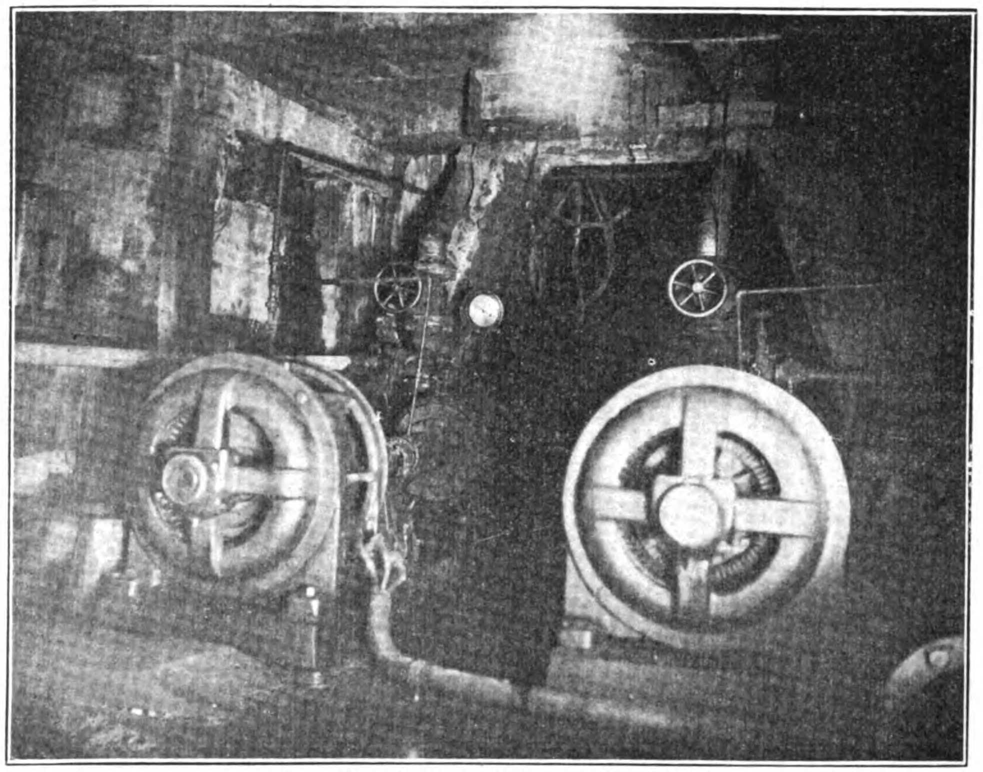
BENGUET CONSOLIDATED GOLD MINES, P.I.



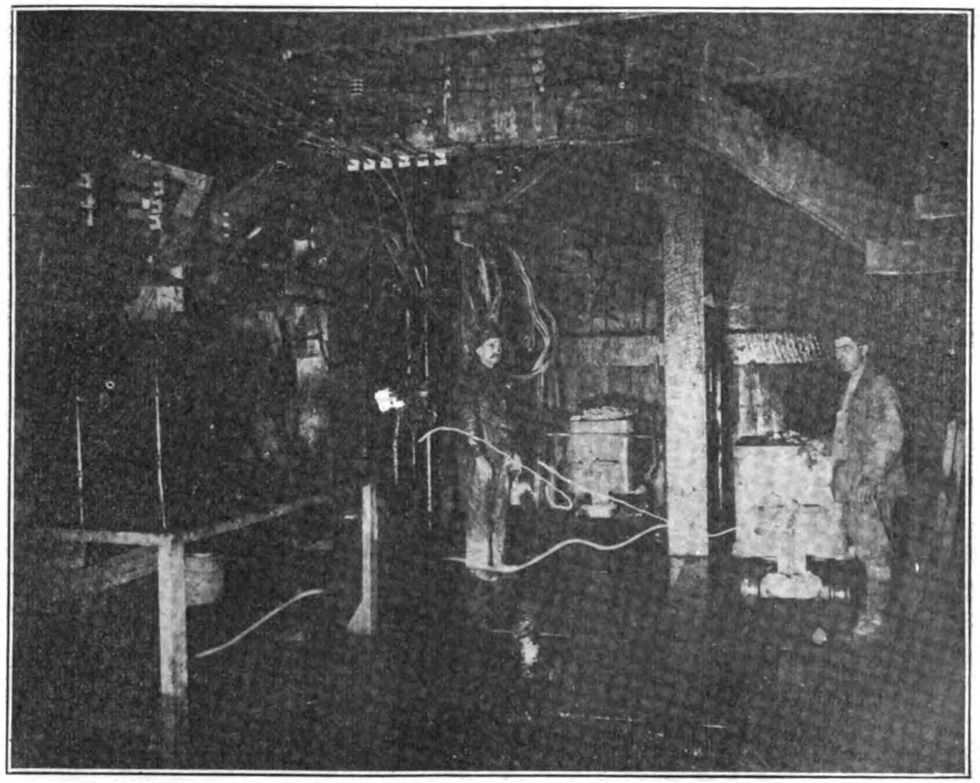
Hand Drilling Crew at Drift Face



Setting up Air Drill in Drift Face



Three Stage Station Pumps on Level "C,"



Shaft Station at Level "C." Car of ore on Cage Ready to be Hoisted (at left)

Australia, of P.100,000 to the persons who first produce a commercial supply of petroleum in that country.

Or let us take a specific case here. The gold mining industry of Benguet depends absolutely upon cheap power—water. The large power project on the Agno River contemplated by the government should be pushed, to make possible the consolidation and successful working of a half-dozen or more low-grade properties now lying idle. Because this is not being done, the government is losing a by no means inconsiderable direct revenue, and the country is losing indirectly by reason of the fact that this potential wealth is not being made available.

American capital, with good reason, has for a number of years been chary about going outside the United States to seek investment, so that the industry here has depended and must still, to a large extent, fall back upon New Zealand, Australian and China coast capital. Our dredging industry has been largely in the hands of New Zealanders ever since it started.

There are indications that the Filipinos are becoming aware of their long neglect of the mineral industry and the number of Filipino prospectors coming in with finds is continually increasing. Although quite a number of them are engaged in coal, gold and iron mining in a small crude way in a few localities, there is no private company of Filipinos engaged in the business on a large scale. It is true that the Philippine government, the majority of whose responsible officials are Filipinos, is now sponsoring several national mining projects whose success cannot be predicted owing to very serious difficulties of a fundamental nature. These have not yet gotten beyond the development stage.

It has been said many times that mining in the Philippines is not a "poor man's game." This is quite true except in gold mining, in which it is possible to make "better than wages" with a very limited capital. In addition to the few Americans engaged in this sort of mining, hundreds of natives get a livelihood by panning the streams. Aside from the great inherent difficulties attending all large industrial enterprises in the tropics, most of the metalliferous deposits are of low grade and refractory. There are exceptions, of course, such as the rich gold placers of the Paracale district, which are now almost exhausted, and the lode being worked by the Benguet Consolidated Mining Company.

The Philippine mineral products in the order of their money value production are : (1) gold ; (2) salt ; (3) stone ; (4) coal ; (5) sand and gravel ; (6) lime ; (7) clay (pottery) ; (8) clay (brick and tile) ; (9) iron ore ; (10) mineral waters ; (11) bituminous rock ; (12) silver ; (13) sulphur.

In the order of their importance in every day life, the list should read about like this : (1) salt ; (2) coal ; (3) iron ; (4) gold ; (5) clay ; (6) stone ; (7) sand and gravel ; (8) lime ; (9) sulphur ; (10) bituminous rock ; (11) mineral waters ; (12) silver.

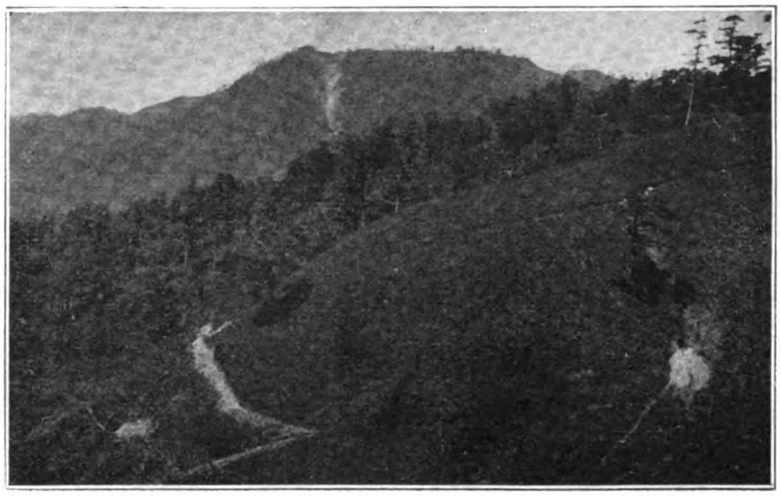
It will be noticed that gold, which comes first in the list of money-value production, is placed fourth in the second list. The reason for this is that gold has little direct industrial use and only an arbitrary and artificial value as money.

Nevertheless, considering the use of gold as a basis for money practically throughout the world, and its universal appeal to mankind as treasure, it plays a tremendous role in our economic system, so that a country to-day finds it imperative to have a gold supply.

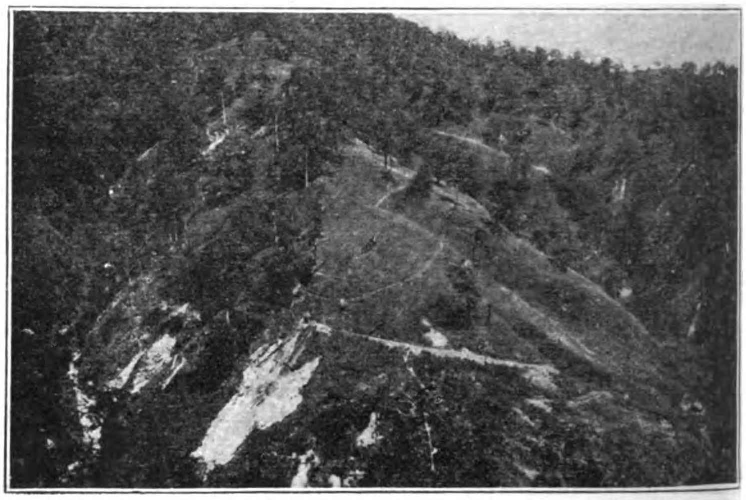
The gold production is still the highest of all the mineral products and the industry remains almost entirely in the hands of Americans with some assistance from Australians and New Zealanders, who are first cousins to Americans in the mining business.

It is noteworthy that, inasmuch as in other countries the gold mining business has fallen off greatly, the Philippines have maintained a steady, though not large, output of the yellow metal, only a few ounces less in value than the banner year of 1916, when the purchasing power of gold was more than it is now.

WHERE GOLD IS FOUND IN THE PHILIPPINES



The Baguio Region



The "Magma" Property in the Gold Region of Baguio

The Aroroy district still leads the others in gold production owing to the continuous operation of its two mines, the Colorado and the Syndicate. Benguet, with its single large producer, alone almost equalling the combined production of the two above-named in the Aroroy district, is a close second. Paracale, whose rather remarkable, though small, dredging field once brought it forward into the limelight, is to-day a mere reminiscence of its former self—only one dredge and a small ten-stamp mill operating.

The Benguet Consolidated, in Antamok Valley, has, during the past few years when many gold mines in other parts of the world have had to close down owing to the low value of gold, steadily paid dividends of from 25 to 35 per cent. At the present writing, the values on the lowest level of the mine are most encouraging, indicating possibly secondary enrichment in the vein. This mine is fast coming to be recognized as one of the notable small gold mines of the world. The vein is a quartz (and some calcite) filling in a fault-brecciated zone nearly 200 feet wide between andesite walls, with two strong veins, one on the hanging, the other on the foot wall with low grade mineralized "country" between. The mineralization in this lode is undoubtedly connected with the quartz-diorite intrusive mass, a short distance to the east. It is noteworthy that the successful producers all around the Pacific including Korea, Alaska and California are generally associated with a rock very similar to this. Gold deposits in the later andesite are neither so rich nor so persistent. A study of the geology of

these deposits years ago indicated what might be expected of them, and early predictions by the government geologists at that time have been fully substantiated.

The gold produced from Philippine mines during 1920 amounted to approximately P.2,500,000; of this the Consolidated turned out P.1,068,892.30.

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The Benguet Consolidated Mining Company

The latest official report on the properties of this concern organized in 1903 under the laws of the Philippine Islands gives its present capital at P.700,000, Philippine currency, divided into one million shares of a par value of seventy centavos each. The original capital was $1,000,000, U. S. currency, but this was reduced in 1916 to P.1,000,000, Philippine currency, and in 1921 to the present amount.

The company owns approximately 420 acres of mineral bearing land, of which 285 acres are held under patent, and 135 acres under location. About 8,000 feet along the strike of the main Benguet lode are included within the holdings of the company.

Since 1915, when the company was reorganized, it has produced gold and silver bullion of a total value of P.4,744,000, Philippine currency, and paid dividends amounting to P.1,400,000. Regular quarterly distributions of five centavos per share are made on March 31st, June 30th, September 30th and December 20th, of each year, and two extra distributions of like amounts are made in January and August. Dividends to shareholders out of the Philippines are paid in San Francisco gold checks at two pesos, Philippine currency, for one dollar, U. S. currency.

Notwithstanding the substantial dividends paid, the strength of the company has been steadily built up until it now has assets consisting of cash, supplies, buildings and machinery, etc., worth more than P.1,000,000, and ore reserves amounting to more than P.4,500,000. This ore estimate does not count ore below Level "C," which is now opened up on top for a distance of more than 830 feet on the hanging wall vein, and more than 400 feet on the foot wall vein. The hanging wall vein on Level "C" for a total distance of 830 feet had an average width of 4.7 feet (four and seven-tenths) and an average value per ton of $40.52, U. S. currency.

The shaft is now at Level "D," which is one hundred feet vertically below Level "C." The crosscut from the shaft to the lode on Level "D" should be in before the end of this year. Geological conditions on Level "C" are such that it is confidently expected the veins on Level "D" will equal those on Level "C" as to size and value.

The ore is a mixture of quartz, iron sulphide, altered diorite and clay, with quartz predominating. Although a very small per cent. of the gold is free, none is visible. The ore treatment consists of crushing, stamping in cyanide solution, grinding to pass 100 mesh in pebble mills, and a nine day cyanide treatment. The pulp is passed through an Oliver filter before final discharge.

Electricity is used for power and lighting. It is furnished by two hydro-electric plants owned by the company and having a combined capacity of 375 K.V.A.

The capacity of the milling and cyaniding plant has been steadily increased from 17,360 tons of ore in 1916 to 35,565 tons in 1920. The production has increased from P.602,500 in 1916 to P.1,068,900 in 1920. During the first seven months of the present year the production amounted to something over P.700,000. Plans are now being considered for increasing the capacity of the plant to 5,000 tons of ore per month, or about 60,000 tons per year.

In writing to a gentleman interested in the "Magma" property, about seven miles south of the Benguet Consolidated Mining Company's field of operations, Mr. Warren D. Smith says, "On the whole from my preliminary examination, I can state that this is a most attractive prospect and I would not hesitate to recommend its serious consideration by persons interested in developing new gold properties. It has this additional recommendation: that it is in the district where the richest gold mine in the Far East is located" The geology of the mine, as described by its mine superintendent, Mr. O. L. Kettenbach, in his last annual report, is as follows:

"The main Consolidated vein is formed by two main fault fissures and a third series of adjustment creeks, formed, I believe, with one exception, contemporaneously with the second of these main fissures.

"In the first two fissures were deposited the main hanging wall and foot wall veins. Of these two the hanging wall vein is by far the older, non-mineralized inclusions being practically absent within it while abundant in the foot wall vein. The fault movements producing both fissures were intense, as is evidenced by the cleanly defined hanging wall of one and foot wall of the other, together with the abundance of clay selvage on both and the intensity of slicken siding which is occasionally seen.

"The advent of the footwall fault in such close proximity to the hanging wall fault created a zone of weakness beginning at the former and extending to the latter. Adjustment cracks and planes always follow major fault movements and I take the numerous cross veins in the mine to have been formed in cracks or secondary fissures caused by these movements.

"These two fault systems are by no means parallel, and the mineralized solutions working along each produced, first, a zone of enriched ore in close proximity to each fault plane, and, secondly penetrated the brecciated mass lying between the two and mineralized it in a ratio varying directly with the distance separating the two fissures.

"The remarkable persistence of values, both laterally and vertically, particularly in the hanging wall fissures, leads one to the belief that the mineralizing solutions were at least fairly deep seated and abundant in their supply."

At present the Company is driving a 3,500-foot drift along the hanging wall of the lead, the entrance to this being in Antamok Cañon to the east of the present workings about 3,500 feet. This is primarily intended for drainage, but it will also be used to thoroughly prospect the lead by means of crosscuts and raises run from it at regular intervals. The old native workings, known as the "Fianza gold mine," are included in the ground to be explored by this drift.

Engineering in Japan

Electricity and shipbuilding to-day are attracting more followers among the youth of Japan than any other forms of employment, according to Mr. Saitaro Oi, of the Nippon Electric Co., of Tokio.

Mr. Oi says that the Japanese universities are paying particular attention to electrical and mechanical engineering. The Imperial University at Tokio and Kioto has more students following these courses than any of its other technical branches. Mr. Oi's father was among the first small electrical engineering group graduated from the university 40 years ago. At that time all of the professors were Occidentals. To-day the entire engineering faculty is composed of Japanese.

When interviewed at the offices of the International Western Electric Co., Mr. Oi called attention to one of the common difficulties that beset prospective telephone subscribers in Japan's rural districts. Before they can get service with the outside world the villagers must find at least 100 of their number who are willing to band together and purchase their own swithboard. Then only can they obtain a wire connection with other localities.—*Engineering World*).

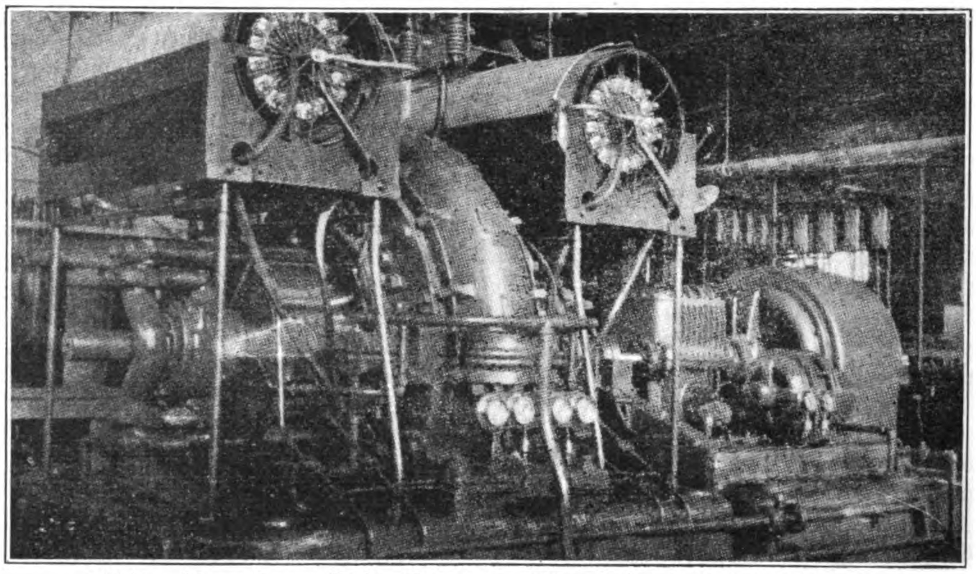
International Radio

By Pierre H. Boucheron of the Radio Corporation of America

RADIO communication is a new international force. It has grown from the laboratory and speculative stage to a most potential factor in the field of international commerce. There is to-day an effective and highly specialized system of long-distance radio communication in actual operation which is gradually spreading its circuits throughout the main traffic centres of the world.

Continent-to-continent radio-telegraph service is now an established business. It forms a valuable supplement to present international communication facilities, and offers an expansion of direct connection with remote sections which, because of geographical features, cannot be conveniently reached by cable or by land line.

Radio-telegraphy is, of course, the most practical means of ship communication and is particularly adaptable to long-distance trans-oceanic communication. It is, therefore, quite international in character and its present and future commercial importance is indicated by the plans for world-wide wireless now being executed by the Radio Corporation of America. This will eventually place radio communication on substantially the same footing with the international cables and mails.

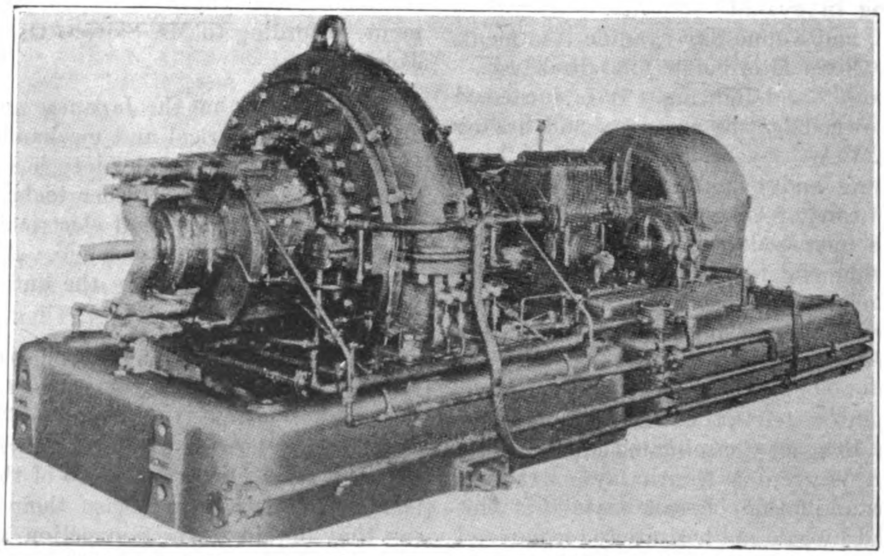


200-kw. Alexanderson Radio Frequency Alternator Installed at the Radio Corporation's Trans-oceanic Station, New Brunswick, N. J.

The Radio Corporation of America

The Radio Corporation of America is the outcome of an arrangement made in the early part of 1920 whereby the interests of the former Marconi Wireless Telegraph Co. of America and the radio activities of the General Electric Company were merged in one organization. Later, an arrangement was entered into with the American Telephone and Telegraph Co., by which the Radio Corporation acquired the use, in its field, of recent radio inventions of great importance which had been successfully employed in transcontinental telephony. These included radio-telephony at great distances, the transmission of public addresses or words of command by loud-speaking telephone and the multiplex use of one wire.

Furthermore, arrangements have been made with the United Fruit Company, for the refitting of their existing radio stations and for the erection in their territory of additional stations which, when completed, will afford the Radio Corporation of America additional and valuable traffic facilities.



200-kw. High Frequency Alternator, shown Installed in Illustration above

These arrangement have had the result of unlocking the patent field and permitting a more extensive and effective use of radio in its manifold applications.

The Radio Corporation of America is to-day engaged in three general activities, namely: trans-oceanic communication, which entails the handling of international messages to and from the United States and Europe and Japan; marine communication, which supplies ship-to-ship and ship-to-shore radio messages, and general sale of radio apparatus to government, private and commercial interests, as well as to the great amateur field which has assumed marked proportions in recent years.

The New "Radio Central Station"

In the general plans of the Radio Corporation of America for world-wide wireless communication, New York city has been chosen as the radio centre. The construction of the "Radio Central Station" which will make this city the focal point of the proposed system of communication, is well under way and one unit was in operation in July of this year. "Radio Central" as it is called, is located at Rocky Point, near Port Jefferson, on Long Island, and is about 50 miles from New York city. This gigantic station will consist of six separate transmitting stations each having a receiving station located nearby, thus affording duplex operation. Each of these six transmitters and receivers will operate simultaneously, thereby permitting the handling of a great amount of traffic. The transmitting station aerials are a mile and a half long, and are being erected in the form of a star about the central power house. The towers which support these aerials are 400 feet high. Each separate unit will, in itself, be equal in transmitting efficiency to the most powerful radio station in operation at present. It will be possible to combine any number of the units for signalling

over exceptional distances under circumstances when great power is necessary.

The Alexanderson Alternator

All long-distance stations of the Radio Corporation employ 200 kilowatts. Alexanderson alternators, which are the most highly perfected continuous wave transmitters developed to date. This machine was perfected by the engineers of the General Electric Company. Briefly, the function of the alternator is to create a steady stream of high frequency currents which in turn produce the electric waves of wireless telegraphy. Indeed, the Alexanderson 200 kilowatts alternator has already proved so reliable and has sent such highly satisfactory signals to European stations, that leading radio engineers of Europe and several government commissions have visited the United States with a view of investigating the system and adopting it for national communication.

The installation at the "Radio Central Station" will include ten of these machines which, in total, will give a power output of 2,000 kilowatts, of 2,700 horse-power. The electrical force thus brought into play will make possible the realization of the dream of communication engineers to transmit messages to all points of the world from a single centrally located source.

The receiving stations will be equipped with a newly developed method of reception which has been devised by Radio Corporation engineers, and which to date is the only apparatus that effectively reduces the effects produced by atmospheric disturbances. This important contribution to the radio art will insure uninterrupted reception from other countries.

Construction of Big Station Under Way

Countless details of great technical interest and engineering importance are incorporated in the specifications for the New York "Radio Central." These have been prepared jointly by the engineering staffs of the Radio Corporation of America and for the General Electric Company giving assurance of perfection in design and detail. The General Electric Company manufactures the necessary apparatus for the "Radio Central Station" as well as for other contemplated links of the world-wide wireless chain, while the construction and operation of the station will be under the direction of the engineering and operating staffs of the Radio Corporation of America.

The present stations of the Radio Corporation on the Atlantic Coast work simultaneously with connecting stations in Great Britain, Norway and Germany and by means of European land lines the radio service extends to Sweden, Denmark, Finland, Poland, Austria, Switzerland, Italy, Spain and Portugal. On the Pacific Coast, the powerful transmitter at Bolinas, Cal., is in constant communication with Japan and Hawaii.

Future International Stations

The Radio Corporation has recently concluded the preliminaries of a contract with the Polish government for the erection of a high-power trans-oceanic station to be located near Warsaw. This station will provide communication between the business interests of Poland and other industrial centres.

The Japanese government, appreciating the value of an international radio service, has erected two high-power stations which are now in service. One Japanese transmitting station is located at Hara-No-Machi near Sendai, and the receiving station at Funabashi. On the American side, the corresponding high-power transmitting station is located at Bolinas, Cal., with the receiving station at Marshall, Cal. The Radio Corporation also maintains a powerful relay station in the Hawaiian Islands.

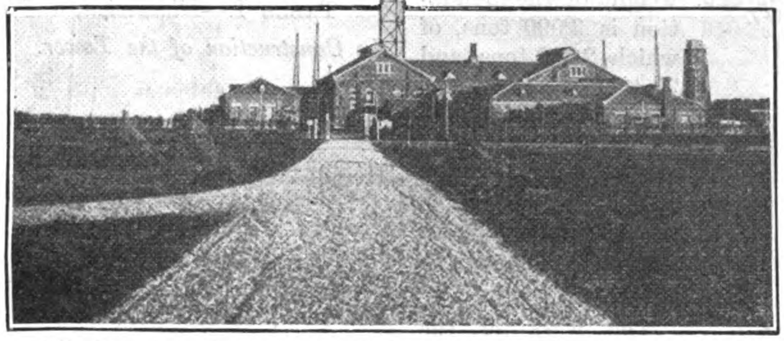
Extensive plants to establish radio service between the United States and Cuba, Brazil and Argentina are now under consideration. Much of this work will be undertaken by the South American Radio Corporation, which now has the project under consideration.

Importance of Radio to Shipping

At present, the owners or agents of a steamer crossing the Atlantic are able to keep in as close touch with their vessels as a railway train dispatcher is able to note the progress of an express train. Moreover, radio provides an immediate means of obtaining assistance in case of distress. In numerous instances hundreds of lives as well as huge sums of money have been saved through the instrumentality of radio.

Radio is an international force destined to play a most important part in the commercial and social relations of all nations. By the co-ordination of the resources, research facilities and talents of the great institutions associated with the Radio Corporation of America, the General Electric Company, American Telephone and Telegraph Co. and United Fruit Co., radio promises to become the foremost agent for extending international communication.

* * *



The Japanese Government Wireless Station at Funabashi, Communicating with the Stations of the Radio Corporation of America in Hawaii and California

The Haranomachi Wireless Station

The Japanese government is rapidly pushing forward its high-powered radio stations in order to receive and send messages across the Pacific in connection with the plants of the Radio Corporation of America. One of the most important of these is the 660-foot reinforced tower station recently erected by the department of communications at Haranomachi, the following description of which appeared recently in *Engineering*:—

1. *The Tower*.—The reinforced concrete tower of the new wireless telegraphy station of Haranomachi, designed for the department of communications by Professors K. Shibata, Y. Nagayama and I. Ksama, of the Tokyo Imperial University, is a hollow cone, with the apex truncated, which rises to the height of 660-ft. (=201.2 m.), or 663.8 *shaku** ; the external base diameter, is 57-ft. 9-in., being to the height in the ratio of 1 : 11. The external diameter at the top is 4-ft. 6-in., or nearly $\frac{1}{13}$ of that of the base. The thickness of the concrete wall varies from 33-in. at the base to 6-in. at the top, the steel rods being embedded in the concrete at the depth of 2½-in. from the outside surface. The composition of the concrete was 1 : 2 : 4 both for the shaft and the foundation. The work of construction was carried on by the Oriental Compressol Company of Tokyo. Table I gives the wall thickness and the median diameter (or the diameter of the cone midway between the internal and external surfaces) for successive $\frac{1}{24}$th parts along the height of the shaft.

The outer and inner surfaces of the tower are not exactly co-apex cones. The height of the centre of gravity is consequently

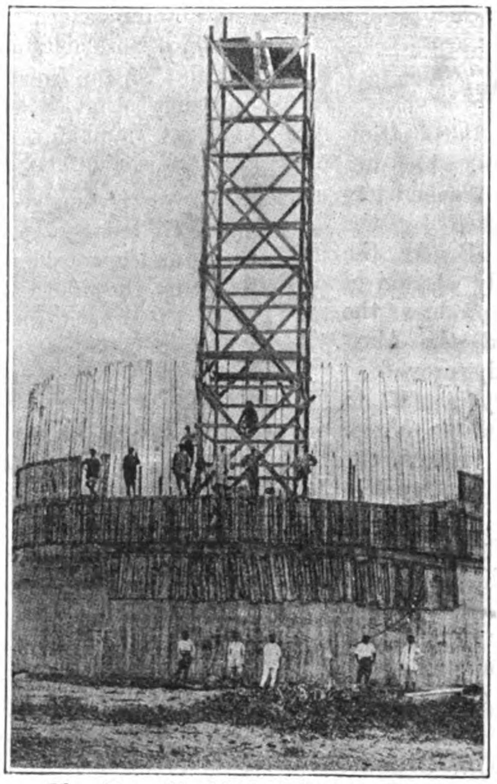
*1 *shaku*, or Japanese foot = 0.99421 English foot.

slightly different from that of a solid cone or a pyramid, although the diameter at the top is sufficiently small in comparison with that at the base. The position of the centre of gravity is about 190-ft. above the ground, namely, at an elevation nearly equal to 1/3.5 of the total height.

The maximum wind pressure taken into consideration in the designing of the tower was 60-lb. per square foot at the base with an increment of 1-lb. per square foot for every 10-ft. height ascension, so that the pressure allowed for at the top is 126-lb. per square foot.

The amount of the material used in the construction of the tower with an allowable maximum pressure of 4-2 tons per square foot on the ground, was as given in the following summary :—

	Structure Steel.	Concrete.	
	tons.		tons
Foundation	79	225 cub. *tsubo* † =	2,930
Shaft	290	550 cub. *tsubo* † =	7,160
Total ...	369	775 cub. *tsubo* =	10,090



The Hara No Machi Wireless Tower at an Early Stage of Construction

The total weight of the shaft is about 7,450 tons, of which 7,160 tons and 290 tons are respectively the weights of the concrete and of the steel. Again the total weight of the foundation is 3,090 tons, of which 2,930 tons and 79 tons relate respectively to the concrete and the steel. The ratio by weight of the steel to the concrete is 1 : 37 for the foundation and 1 : 25 for the shaft.

Fig.1. ELEVATION & HORIZONTAL SECS.

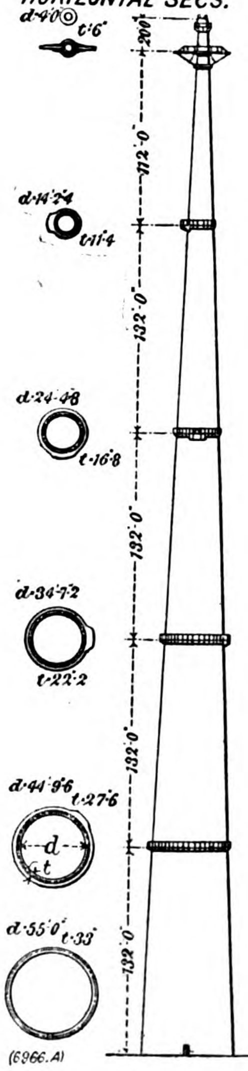
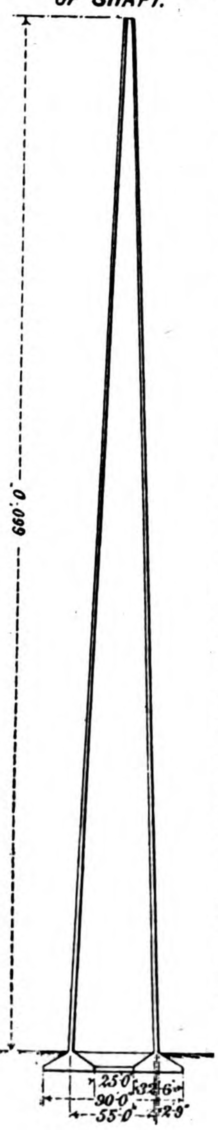


Fig.2. VERTICAL SEC. OF SHAFT.



The work of the foundation construction was started on May 23rd, 1919, and the shaft, built successively in 147 divisions or layers of concrete deposit, each 4-ft. 6-in. in height, has been completed on September 26th, 1920, at 3 p.m. The tower wall has no opening, except one narrow entrance at the base, and four small windows each 2-ft. square, at successive intervals 132-ft. in height.

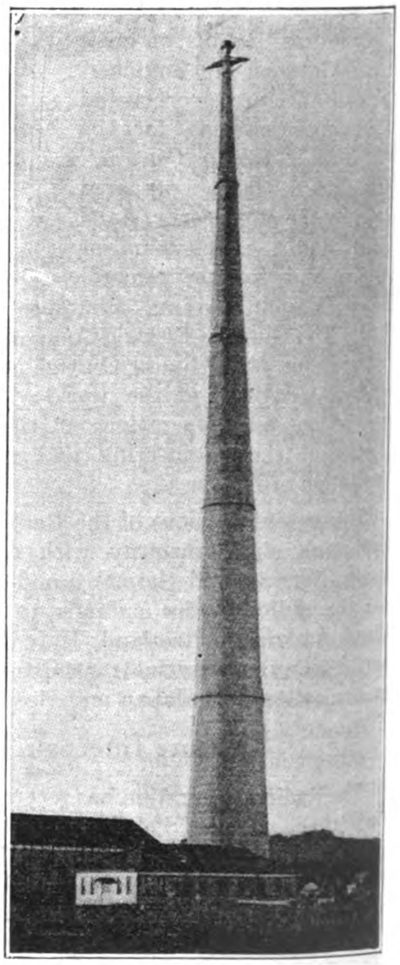
2. *Nature of Soil.*—The tower stands on a narrow alluvial plain about the small River Shinden-gawa, passing between the low tertiary hilly districts. For the surface 4-ft. the soil is composed of black and red earths. Then comes a layer of sand about 4-ft. in thickness, lying upon a layer of clay 2-ft. thick. Next below comes a layer of gravel and sand more than 10-ft. in thickness, on which the foundation of the tower rests. The different formations are arranged horizontally, a circumstance favorable to the erection of a heavy structure.

We have no exact knowledge of the period of the earthquake vibration at Haranomachi, as no seismographic observation has been made there. For the sake of reference, I give in Table II the value of the period of large earthquake vibration measured seismographically at different places where the ground is composed of alluvial soil.

Of the different places here taken into consideration, Hitotsubashi, in the lower portion of Tokyo, is to be regarded as an example of deep and very soft alluvial soil; and the vibration period there is invariably about 1 second, both for small and large earthquake movements.

TABLE I.—*Dimension, and the Amount of Material used in the Construction of the Tower.*

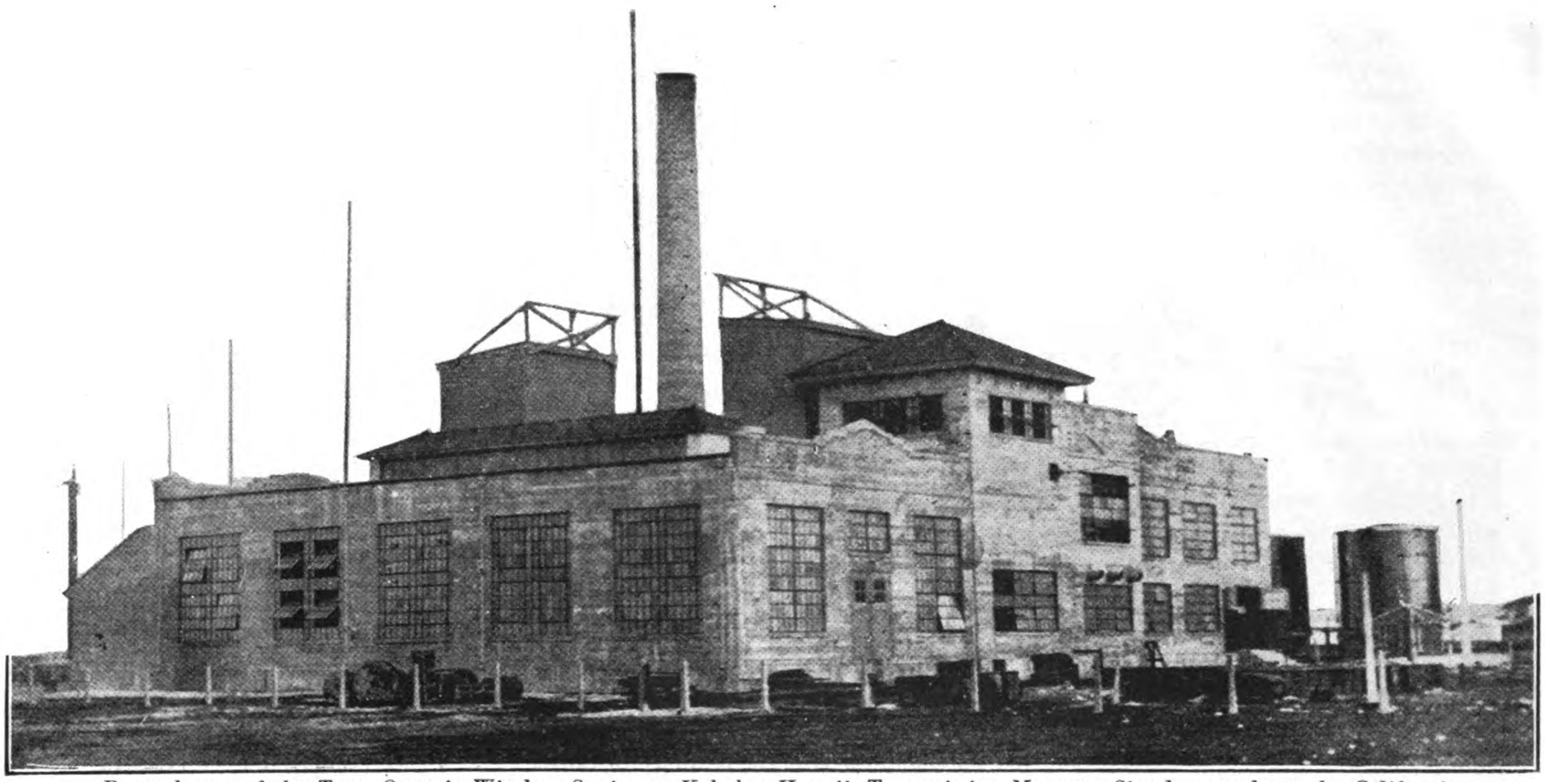
Height.	Median Dia-meter.‡	Thickness of Wall.
ft. in.	in.	in.
Base	660.0	33.00
27 6	634.5	31.88
55 0	609.0	30.75
82 6	583.5	29.63
110 0	558.0	28.5
137 6	532.5	27.38
165 0	507.0	26.25
192 6	481.5	25.13
220 0	456.0	24.00
247 6	430.5	22.88
275 0	405.0	21.75
302 6	379.5	20.63
330 0	354.0	19.5
357 6	328.5	18.38
385 0	303.0	17.25
412 6	277.5	16.13
440 0	252.0	15.00
467 6	226 5	13.88
495 0	201.0	12.75
522 6	175.5	11.63
550 0	150.0	10.5
577 6	124.5	9.38
605 0	99.0	8.25
632 6	73.5	7.13
660 0	48.0	6.00



The Hara No Machi Tower Completed

†1 tsubo = 6 *shaku* cube = 216 cub. *shaku* = 212.3 cub. ft.

‡ Diameter from middle to middle of the concrete wall.



Power-house of the Trans-Oceanic Wireless Station at Kahuku, Hawaii, Transmitting Messages Simultaneously to the California Stations of the Radio Corporation of America and the Japanese Government Station at Funabashi

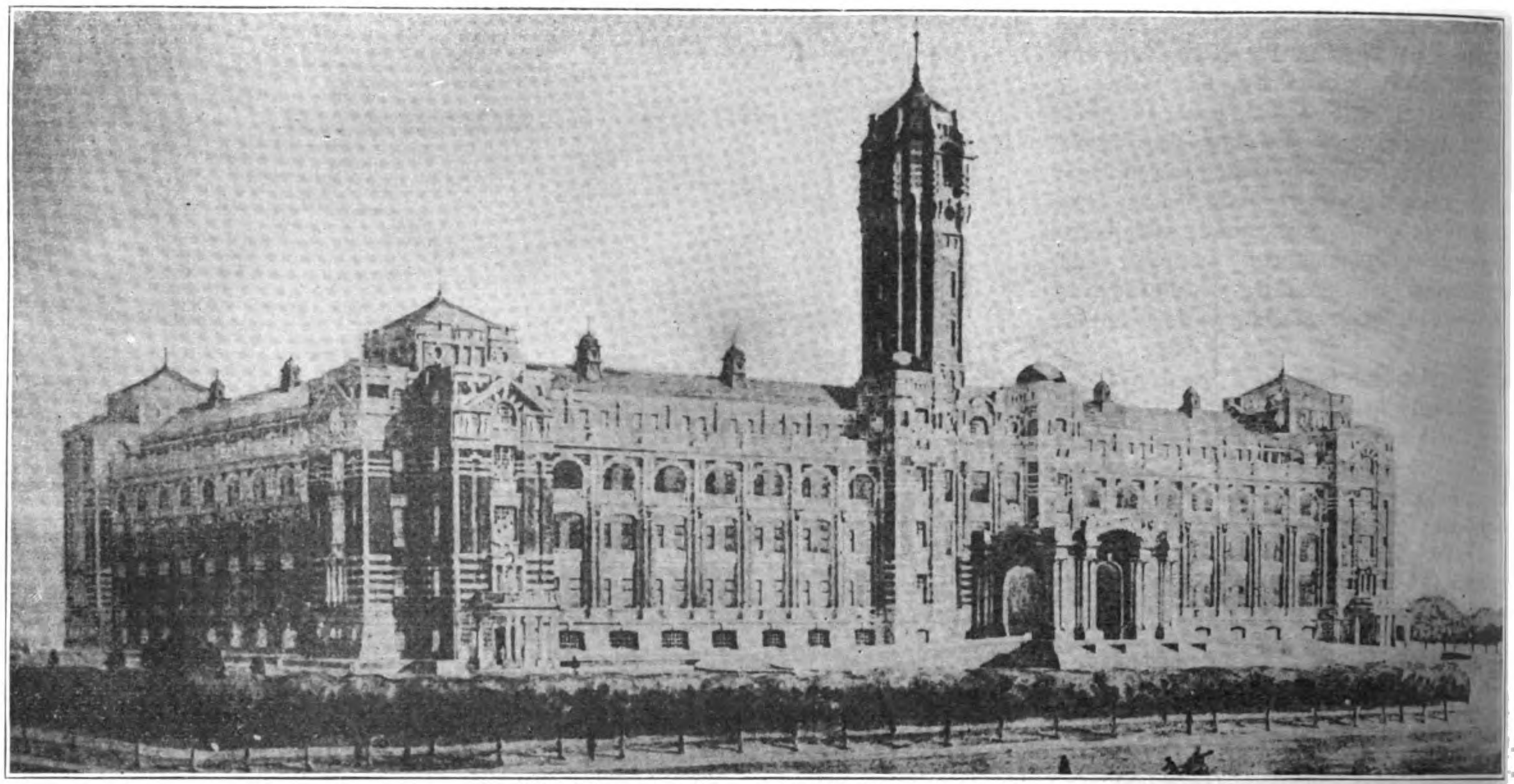
Foundation :—
  Diameter of the bottom area ... = 90-ft.
  Thickness (depth) ... ... = 12-ft.
Shaft :—
  Height ... ... = 660-ft.
  External diameter at base ... = 57-ft. 9-in.
  External diameter at top ... ... = 4-ft. 6-in.
  Wall thickness at base ... ... = 33-in.
  Wall thickness at top ... ... = 6-in.

Amount of concrete :—
  Foundation = 225 cubic *tsubo* = 47,759 cub. ft.
  Shaft ... = 550 cubic *tsubo* = 116,745 cub. ft.
Steel reinforcement :—
  Foundation ... ... = 79 tons.
  Shaft ... ... = 290 tons
Diameter of steel reinforcement :—
  In the foundation = 1-in., $\frac{7}{8}$-in., $\frac{3}{4}$-in.
  In the shaft ... = $1\frac{1}{8}$-in., 1-in., $\frac{7}{8}$-in., $\frac{3}{4}$-in., $\frac{5}{8}$-in., $\frac{1}{2}$-in.

American Capital in Japanese Commercial Alliance

THOSE who take more than passing note of American business activities in the Far East will be attracted by the interesting commercial alliance which recently occurred in Japan. The Nippon Electric Co., an allied company of the International Western Electric Co. of New York, and said to be the oldest concern with participating foreign capital in the Mikado's realms, has joined forces with the Sumitomo Electric Wire & Cable Works, of Osaka, one of the oldest commercial enterprises in Japan. A new company has been organized to be known as the Sumitomo Electric Wire & Cable Works, Ltd., for the production of power, telephone and telegraph cable. It has started with a capital of Y.10,000,000, or about $5,000,000. Under the provisions of the alliance, the Nippon Electric Co. has granted to its new associate the right to use all its manufacturing and engineering information and patents which it receives from Western Electric Co., covering the production of cable. The Sumitomo company, which is primarily a manufacturing concern, on its side agreed to assist the Nippon company in the sale not only of electric wire and cable but also all its other products.

In the association of the Sumitomo and Nippon Electric companies there is an element of historic interest. The House of Sumitomo is one of the oldest banking and commercial organizations in the empire. Its activities were first recorded in 1690, when, with the discovery of the Besshi copper mine, the family became engaged in mining. In 1868, after the restoration of the power of the emperor, the Sumitomo interests began to broaden, and there were founded in quick succession the Sumitomo Copper Sales Co. ; the Sumitomo Warehouse Co. with branches at Tokyo, Osaka and Kobe ; the Sumitomo Bank, Ltd. ; the Sumitomo Steel Works ; the Sumitomo Fertilizer Manufacturing Co., and the Electric Wire & Cable Works. The Nippon Electric Co. dates back to 1895 when the Western Electric Co. founded an agency in Japan. At that time the laws of the island empire prohibited the introduction of foreign capital into Japan for participation in any commercial enterprise. This ban was lifted in 1899 and the modest agency of the great American electrical concern was broadened into the Nippon company, with a capital of Y.200,000 Its present authorized capital is Y.10,000,000. Baron K. Sumitomo, the managing genius of most of the new enterprises which bear his name and one of the heads of the new company, is a great admirer of American methods. He has made several personal and extensive investigations of industries and mines in the United States and Europe. In 1911 he was created a baron as a reward for the noteworthy services he had rendered to industrial Japan. He will have as his associate in the new enterprise, K. Iwadare, managing director of the Nippon Electric Co.—*Electrical Review.*



New Formosan Government Building at Taipeh

Progress in Formosa

AS in Korea, the semi-tropical island of Formosa is progressing steadily under the benefits of Japanese rule. From a land of savages it has become a self-supporting community contributing its natural riches to the markets of the world in ever increasing quantities. The special laws promulgated to cover conditions in the island when Japan first entered into its possession have given place to a new set of regulations and the entire government has been reorganized on lines similar to those which prevail in the administration of the British crown colonies.

Political Advances

The great problem which has always confronted the Japanese administration is the question of assimilating the native Formosan Chinese and bringing them to the point where they can be governed by the same laws existing in the home country. As one means of accomplishing this end the government-general has been sending many students of merit to complete their education in the schools in Japan. The number so far sent has not been sufficiently great to produce any appreciable effect but the idea is pronounced feasible and the educational authorities are now advocating sending at least one-half of the body of Formosan students to Japan every year to complete their education. Recently there has been some agitation for a representative legislative assembly in the island but the time has not come for such a great innovation. But government support is being given a scheme to send Formosan representatives to the imperial diet, with similar rights and privileges granted to the Japanese legislators.

Finances

Japanese rule in Formosa, however, can only best be gaged from its financial standpoint, and as in the case of Korea, the figures prove that material advantages have accrued to the natives which to a large extent offset their backwardness in political development. From an island province ruled over by grasping Chinese mandarins into whose coffers poured the wealth of the people, Formosa has now an annual budget which represents an increase of 1,200 per cent. over that of 25 years ago when Japan took hold.

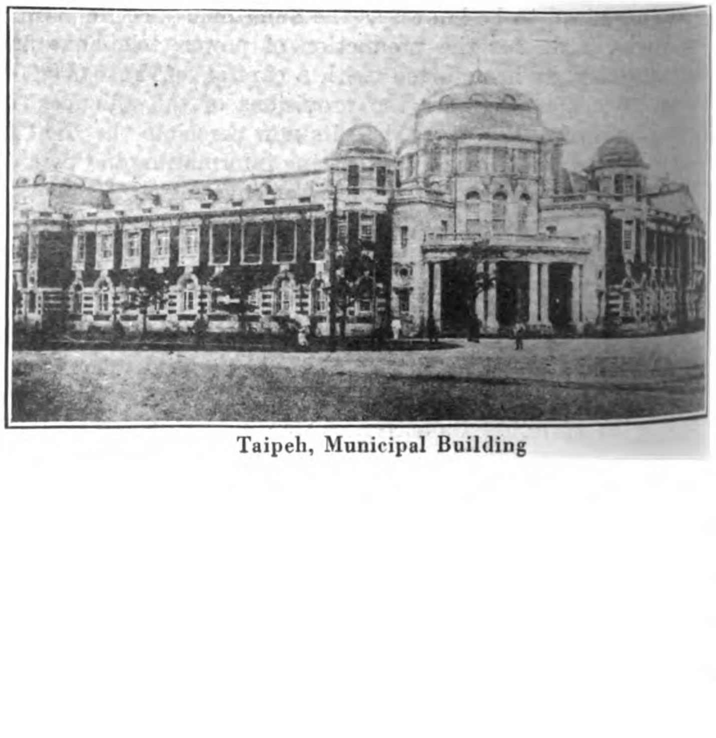
The following table showing income and expenditures of the island government in 1897 after 2 years of Japanese rule, in 1912 afte- 17 years and to 1921 after 27 years are illuminating:—

INCOME

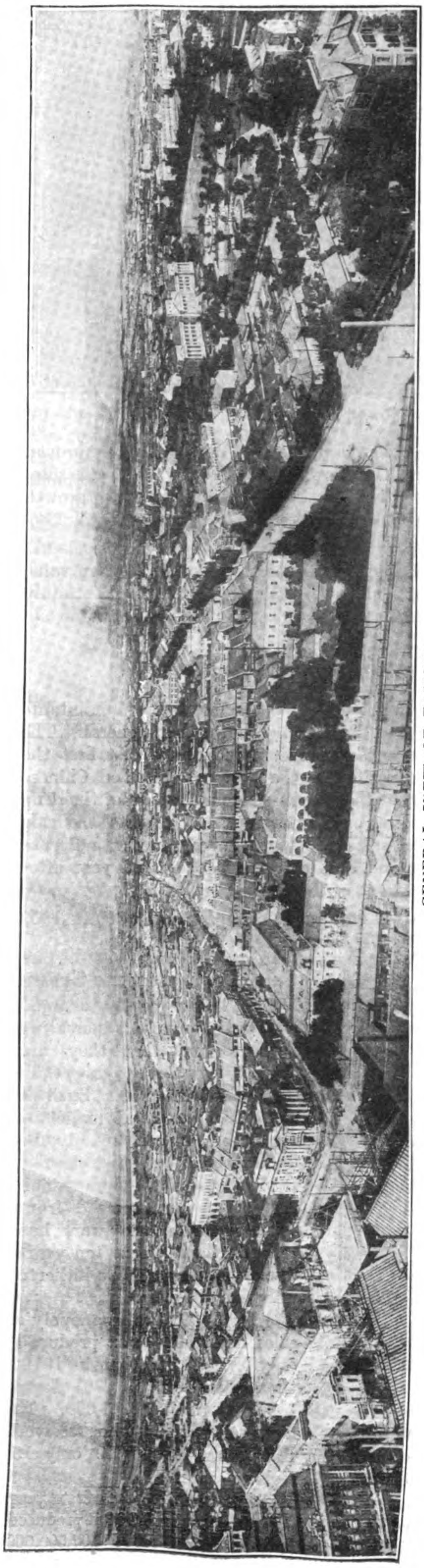
	Ordinary Yen	Extraordinary Yen	Total Yen
1897	2,624,158	71,027,938	9,652,098
1912	4,259,020	17,764,937	60,292,057
1921	88,551,005	26,405,854	114,956,859

EXPENDITURE

	Ordinary Yen	Extraordinary Yen	Total Yen
1897	5,913,243	3,738,855	9,652,098
1912	22,687,771	21,500,805	44,288,805
1921	79,639,756	35,317,107	114,956,859



Taipeh, Municipal Building



GENERAL VIEW OF TAIPEH

A Self-Supporting Colony

For the first ten years of Japanese rule deficiencies in revenues were made good from the Japanese treasury, but since 1905 the island has been self-supporting. In fact in 1909 the government-general exchanged a part of the sugar consumption tax with the national government for the privilege of maintaining its own customs service and collecting the customs tax on the imports of the island. The tariff is the same as that of Japan. In 1914 the whole revenue from the consumption tax on sugar was surrendered to the national treasury.

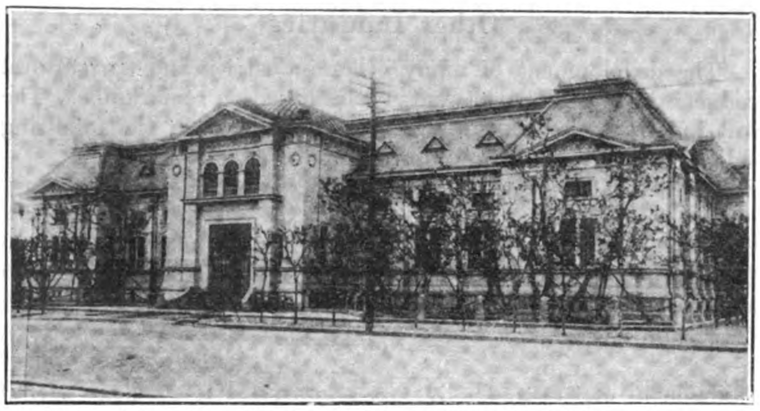
Agricultural Wealth

Essentially an agricultural country, like other parts of China no real effort was ever made to increase the acreage and yields of the staple crops until the Japanese assumed control. In 1899, or three years after annexation, the cultivated area of Formosa was only 870,806 acres, while in 1919 it had increased to 1,740,915 acres. At the same time the value of the crops rose from Y.72,000,000 in 1909 to Y.245,650,000 in 1919.

Owing to the tropical climate it is possible to raise two crops of rice a year in some parts of Formosa, and it is even possible in especially favored localities to obtain three crops a year. The quality of Formosan rice is better than rice from China and it is therefore slowly finding favor in the home country. In fact Formosan rice is shipped to Japan and cheap Chinese rice is imported to take its place in Formosa. In 1919 the production of rice was 4,922,000 *koku*, valued at Y.132,220,000.

Sugar Industry

In the development of a modern sugar industry, Japan has shown with governmental stimulation in Formosa that it is possible to profitably produce sugar in climatic and soil under conditions closely resembling Louisiana. This industry, however, is confined to the southern parts of the island, around Taichu, Kagi and Tainan. In 1919 some 288,622 acres were planted with cane, and 486,355,000 *kin* of raw sugars were extracted from the cane raised.



The Financial Heart of Formosa : Head Office of The Bank of Taiwan

Tea is another important field crop, whose annual production is about 19,000,000 *kin*, valued at seven or eight million yen. Sixty per cent. of the tea is Oolong tea which is exported to the United States.

Forests and Lumbering

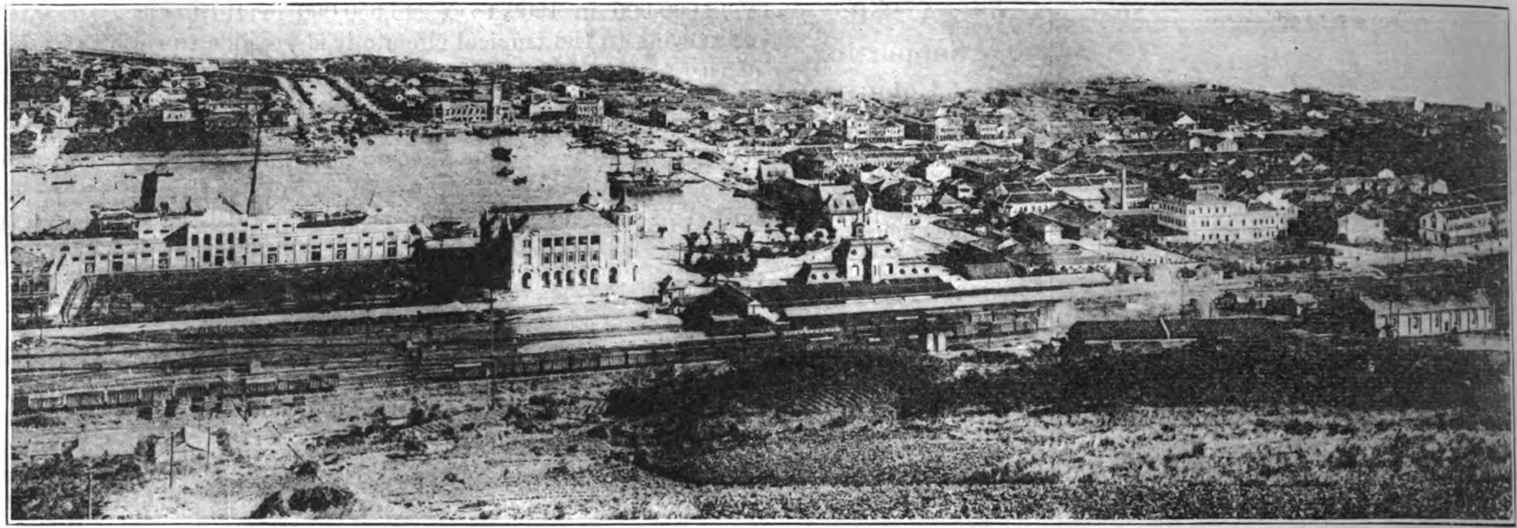
At least half of the island of Formosa is mountainous country covered with fine virgin forest. According to the investigations of the authorities there are 2,234,945 acres of government and private forests which have not yet been exploited. The government maintains a saw mill on Mt. Ari which is very well known, and its operations extend over 26,500 acres, which are estimated to contain 80,000,000 board feet of fine hard-wood timbers. Many of the trees are over 20 feet in diameter and are said to be over 3,000 years old.

The future of the timber of Formosa is very bright. The woods are all hard woods, and they have beautiful grains and markings which make them especially desirable for interior decorations and fine furniture making.

Mines

The number of mines in Formosa is increasing every year. Between 1898 and 1919 the production of the mines increased over 100 times in value : in 1898 gold, coal, oil and sulphur were produced valued at only Y.112,000 : in 1919 there were 934 mines in operation which produced Y.11,170,000 worth of metals and minerals.

There is not much coal in Formosa and at first its production was greatly hampered by the old-fashioned methods of mining in use. But from 1905 new machinery has gradually been installed in all the mines, so that in 1919 production reached 1,080,607 tons, worth Y.8,825,000.



GENERAL VIEW OF KEELUNG, FORMOSA

Other Industries

The development of many other industries and agricultural products during the past twenty years has been remarkable. The most important agricultural products are listed in the following table, all figures being given in thousands:—

	1900	1919
	kin	*kin*
Potatoes	404,000	16,000,000
Peanuts	120	350
Beans	50 *koku*	128 *koku*
Wheat and barley	20 *koku*	40 *koku*
	kin	*kin*
Yellow hemp	1,440	4,740
Other hemps	1,020	1,720
Indigo	1,730	3,360
Tobacco	196	1,120
Oranges	2,200	9,610
Bananas	10,536	37,533
Live stock (thousand omitted)		
Cattle and water buffaloes	193 head	404 head
Swine	480 head	1,194 head
Silkworm cocoons	264 *koku*	828 *koku*

Sea Wealth

In early years the value of water products was not known, but in 1914 the value of the fish caught in Formosan waters was Y.1,662,000. In 1919 this had reached Y.5,058,000, while the value of manufactured foods from marine products was in 1914 only Y.384,000, and reached in 1919 Y.1,427,000. Other manufactured foods, other than fish, increased in value from Y.1,067,000 to Y.2,427,000 during the same years.

Foreign Trade of Formosa

Formosa's foreign trade includes trade with Japan, Chosen and Kwantung. It is carried on from the ports of Tamsui, Keelung, Anping and Takao. Six lines of steamers are regularly engaged in the trade with China from these four ports.

In 1898, the foreign trade of Formosa with Japan and all other countries was only Y.30,000,000, both in imports and exports. In 1907 the total foreign trade was Y.50,000,000. By 1910 as the result of an increased circulation of money, and improved banking conditions, and the growth of the sugar trade, the total reached one hundred million yen. In following years the growth was: 1912, Y.125,000,000 in exports and imports: 1917, Y.234,690,000 and in 1919, Y.332,580,000.

With the fall in the price of sugar, however, the future value of the foreign trade, particularly the value of exports, will certainly fall far below the totals for 1919.

Government Bureau of Civil Engineering, Taipeh

Government Monopolies

Certain industries important for the welfare of the inhabitants are monopolies of the Formosan government-general. The most important of these is the opium monopoly. At first the trade was almost a necessity for the opium debauched Chinese inhabitants and to protect them from continued abuse of the drug the government-general at once undertook to regulate the sale and manufacture. The sales of the monopoly, under a license system which is strict and equitable, have decreased year after year since the very beginning of the Japanese rule.

In 1899 sales were 47,000 *kwan*, dropping to 38,000 in 1909 27,000 in 1916 and to 19,278 *kwan* in 1919.

Sales Drop; Income Grows

It is frequently charged that the monopoly is increasing its sales and that they are actually greater to-day than they were in 1899. Such a charge is pure and malicious nonsense, as can readily be understood from these figures.

The price of opium, which the monopoly imported from Turkey before the war, has risen during the past ten years like everything else, to hitherto unheard of levels.

In 1899 the monopoly's sales of 47,000 *kwan* produced only Y.1,539,000, but in 1919, the sales of 19,278 *kwan* brought in Y.6,947,000. In 1899 there were 20 persons in every thousand who received government licenses to use the drug, but in 1919 only 15 persons in the thousand were still smoking opium.

The government-general's salt monopoly in the first year of its operation produced 39,000,000 *kin* of salt. In 1903 it produced 50,000,000 *kin*, while in 1919 the production reached 107,000,000 *kin*. Salt is exported from Formosa to Japan.

Camphor Important

The camphor monopoly found the production of camphor seriously on the decrease up to 1899, so that it began to plant trees in government-owned forests. In 1919 about 130,000 acres had been replanted, and production which in 1904 was only 720,000 *kin*, had risen to 3,513,000 *kin*. Waste products from camphor refining brought in Y.317,000 of revenue in 1900, while in 1919 they produced Y.917,000. Of course, the rise in price of all camphor products accounts largely for this difference in value.

The tobacco monopoly was established in 1906. It makes pipe tobacco, cigarettes and cigars. The monopoly controls the planting of 1,200 acres, which produced in 1919, over 1,130,000 *kin* of tobacco, valued at Y.9,709,000. This is an increase of over 55 per cent. in only fourteen years.

Manufacturing Future

The future of manufacturing industries in Formosa is dependent on the development of the water power resources of the island. The government in combination with private capital is now developing 130,000 kilowatts of power, which will be used to develop chemical industries.

It can be seen from this sketchy review of industry in Formosa that the development under Japanese rule has been very marked. Great credit is due to the unflagging zeal of the officials who have been in charge of the never-ceasing governmental measures to make the island a self-supporting colony, and a valuable asset to the Japanese empire.

The Clyde's Largest Dredger for India

THE *Gunga* launched by William Simons & Co , Ltd., to the order of the commissioners for the port of Calcutta, is the largest dredger yet built on the Clyde, and is the third dredger built by Messrs. Simons for the improvement and maintenance of the River Hooghly.

The dredger is 370-ft. in length × 57-ft. 6-in. × 24-ft. 6-in., and has a hopper capacity of 80,000 cubic feet, and has been specially designed for the unique character of the dredging to be done on the Hooghly.

The suction pipe is arranged to dredge to a depth of 45-ft., and is designed with a trunnion at each end of the well so that dredging can be done when the vessel is propelling either ahead or astern. Or alternatively, dredging can be done while the vessel is moored to anchors either ahead or astern.

Owing to the light specific gravity of the drift sand and silt deposited in the river Hooghly during the flood season, special attention had to be given towards providing appliances which would eliminate as far as possible the loss of material in the overflow from the hopper. The dredger is accordingly fitted with the "Simons" patent sand baffling arrangement. This arrangement has been proved most effective in its action in reducing the loss in overflow to the minimum.

The hull and machinery are constructed to Lloyd's highest class. The main deck is of steel, sheathed with teak. Steam and hand-steering gear is fitted, and a very complete installation of electric lighting is provided, including one searchlight.

The propelling and pumping engines are placed in two independent compartments. The propelling power is supplied by two sets of triple-expansion surface-condensing engines, embodying all the latest improvements in marine engine practice, including steam and hydraulic reversing gear, steam turning gear, independent circulating pumps, automatic feed pumps, feed heaters and filters, large evaporators for feed water make up, and a complete outfit of auxiliary feed and bilge pumps. Steam is generated by four large single-ended horizontal multitubular boilers, constructed to Lloyd's rules for a working pressure of 180-lbs. These boilers are designed with ample surface for burning Bengal coal under forced draught. Two ash ejectors are fitted in the stokeholds. The pumping outfit, placed forward of the hopper in an independent engine room, consists of one set of triple-expansion engines, with independent condensing plant and circulating pumps, complete with all modern fittings. The pump engines are coupled direct to a centrifugal sand pump specially designed to raise and discharge about 5,000 tons of sand and silt per hour. The pump is connected to a suction pipe, placed in a well at fore end of the vessel, being fitted at upper end with a massive swivel bend which serves as a trunnion or hinge upon which the pipe is free to move vertically. The suction end of the pipe is fitted with a specially designed drag nozzle a suit the character of the material to be dredged while a grid is also fitted to the nozzle to exclude material which might choke or damage the pump. The suction pipe is controlled by a steam winch placed on deck.

The discharge pipe from the sand pump is carried over the hopper and fitted with trimming doors.

The bow winch has three large independent wire rope drums for working long lengths of heavy steel wire rope and two cable holders for chains. The winch is driven by a vertical high pressure engine, the gearing throughout being of steel. At the stern a large windlass is fitted having two independent cable holders and two warping ends of extra large dimensions.

The material in the hopper is discharged through the bottom by cylindrical valves hydraulically controlled.

The cabin accommodation for officers and crew and the ventilation of the ship throughout have been specially designed for a hot climate.

The *Gunga* has been constructed under the direction of Mr. J. Angus, M. Inst. C. E., engineer and London agent to the Calcutta port commissioners.

Admiral Line Gaining Strong Position

WHEN, early in July, four large United States shipping board vessels lay at one time at Pier B, of the port of Seattle, the largest commercial wharf in the world, a graphic picture was presented of the rapid progress being made in the effort to win ascendency for the American flag in the commerce of the North Pacific, via the great circle trade route to and from the Orient. The mammoth terminal, constructed by Seattle at a cost of more than $5,000,000, is justifying the faith of its builders by becoming the home berth of an increasing fleet of American ships engaged in trans-Pacific commerce.

Pier B, of the great terminal is being used as the American terminus of the Admiral Line, which inaugurated the all-American passenger and freight service between Puget Sound and Oriental ports, with the sailing of the *Wenatchee* on April 9, followed by the *Silver State* on July 9. The four ships which lay at Pier B were the passenger and freight liners *Wenatchee*, *Keystone State* and *Silver State* and the freighter *Edmore*, all shipping board vessels allocated to the Admiral Line for operation. They represent an investment by the people of the United States of $27,000,000.

It is expected that additional vessels will be allocated to the Admiral Line for this service, making the capacity for passengers and freight of the American line far greater than that of any of its foreign competitors which, in the past, have carried the bulk of American commerce out of Puget Sound. The vessels which have so far sailed in the service have carried large cargoes, encouraging the belief of Admiral Line officials that American ships can gain control of the trans-Pacific passenger and freight business originating in the United States, which constitutes the bulk of the traffic.

Pier B was recently completed at a cost of $2,500,000. It is 2,500 feet long and 365 feet wide, larger in area than Pier A, the first constructed, which is 2,540 feet long by 310 feet wide. The piers are equipped with transit sheds and modern machinery, insuring rapid and economical handling of cargo and giving American ships a decided advantage in this respect over Canadian and British ships in British Columbia ports.

FAR EASTERN IRON AND STEEL

JAPAN'S PIG IRON OUTPUT SHOWS DECREASE.—Japan's pig iron output during August amounted to 15,785 tons, comprising 2,967 tons at Kamaishi, 2,334 tons at Wanishi, 6,732 tons at Kenjiho (Chosen), and 3,752 tons at Penchihu (Manchuria), all operated under Japanese management, showing a decrease of 328 tons from the previous month.

An active demand for pig iron caused an increase of sales and 760 tons were contracted for. Of these sales Kamaishi pig iron totalled 3,158 tons, Wanishi 3,465 tons, Kenjiho 3,934 tons, Penchihu 6,685 tons, and Totetsu 3,518 tons, showing an increase of 3,653 tons over the previous month.

The present amount of stock on hand totals 172,488 tons, Kenjiho 52,293 tons, Penchihu 30,107 tons, and Totetsu 20,360 tons, showing a decrease of 8,163 tons from the previous month.

The output is expected to decrease more, as the Penchihu Colliery and Mining Company has proposed to totally suspend operations. This will naturally tend to increase prices although in spite of the outlook the current prices remain depressed.

Wanishi pig iron No. 1 is now quoted in the neighborhood of Y.63.

* * *

INDIAN STEEL FROM NEW FURNACES TO BE CHEAPEST IN WORLD.—A great steelworks is being established in Bihar and Orissa capable of producing three-quarters of a million tons of pig-iron and half a million tons of steel annually. It is believed that India is capable of producing the cheapest steel in the world.—*Reuter.*

* * *

STEEL RAIL REDUCTIONS.—The United States Steel Corporation in announcing a reduction of seven dollars a ton has reduced the price of standard rails to $40.

Mr. Gary, president of the Corporation, has said that the present costs of production did not justify this attention, but he hoped and expected that the reduction in freight rates, together with larger operations, would have a beneficiary effect upon the costs.—*U.S. Navy Radio through Reuter.*

* * *

NEW COMPANY TO OPERATE IN JAVA.—Wm. H. Muller & Company, of Rotterdam, have started at Sourabaya, a branch establishment with sub-branches at Batavia and Bandoeng, for the sale of iron, steel and railway material. A start has likewise been made with the foundation of other sub-branches in Java, while a plan has been formed to be represented also in Borneo and Sumatra. At Sourabaya and Batavia there are two warehouses for the storage of iron and steel, viz., for bar iron, beams, plates, wire and wire nails, tubes, etc., and also for railway material, including rails for narrow-gauge lines.

* * *

TO AID JAPAN'S IRON INDUSTRY.—There will be an indefinite delay in making effective the recently enacted Japanese iron industry encouragement act, which was to have become operative on July 1. One provision of the act is that any person engaged in the iron industry with equipment to produce at a single place 5,250 metric tons or more yearly of pig iron or steel may be exempt from taxes on his industry and from income taxes on the profits yielded in the year in which the industry is started and for the following ten years. The 5,250 metric tons mentioned shall mean 2,500 metric tons in the low phosphorus pig iron industry.

* * *

PROPOSED JAPANESE TRUST.—The combination of six private iron and steel companies in Japan is proposed by the government's financial and economic investigation committee, as a remedy for the present financial difficulties of the industry in Japan, according to a report. It is suggested that the Japanese government should give substantial aid to the combined companies, which would have an output about equal to that of the Wakamatsu State Steel Works, while these private plants and the government works together would control about 90 per cent. of the country's total production.

* * *

GOVERNMENT IRON WORKS TO RE-OPEN: JAPAN.—Stimulated by a dearth of stock at the opening of the season for demand, the steel and iron market has begun to put on an air of animation with an upward tendency of price.

The local iron market has risen from the bed-rock rate of Y.54 to Y.57 and many trades are being made. The cargo movement of iron is expected to revive suddenly when the weather improves.

Indications point to the possibility of a further rise of prices.

In anticipation of reanimation in the iron market, the Government Steel Works has decided to resume operations at some of its iron foundries. Sales of Government Steel Works iron total 29,000 tons monthly.

MACHINERY MANUFACTURERS.—Sasagawa & Co., 144 Imaki-cho, Nishi-ku, Osaka, have opened offices under the managership of M. K. Sasagawa.

* * *

THE SHIRAI STEEL MANUFACTURING CO. was organized recently with a capital of Y.50,000, fully paid up, to manufacture steel. Office at Nagase-mura, Kawachi-gun, Osaka-fu. Manager: Mr. K. Shirai.

* * *

SHANGHAI ARSENAL MAKES WATER PIPES.—The Shanghai Arsenal is manufacturing water pipes in all sizes by the method of vertical casting. Thickness uniform, tests under different pressures.

* * *

CHINA IRON WORKS CO. BEING ORGANIZED.—Mr. Nieh Gee-gih, returned from abroad, with three other experienced Chinese engineers who have studied in Europe and America for a long time, is organizing the China Iron Works Co. at Woosung Creek. The new company is to manufacture looms, weaving machines and other engineering tools and supplies and is to be capitalized at $300,000 in 3,000 shares of $100 each. Applications for registration have been made to the ministry of agriculture and commerce.

* * *

JAPANESE STEEL-TRADE.—September and October are usually months of active demand in Japan, and steel manufacturers, importers and dealers are expecting a revival in trade to start at this season. Aside from seasonal signs, they predicate their belief on factors quite generally acknowledged as of barometric value.

Stocks of iron and steel products held in customs compounds in Yokohama, Kobe and Osaka, and in public and private warehouses at the beginning of this year were very large. No close estimate was obtainable, but the aggregate was believed to be over 300,000 tons. Just how much of this has been consumed is not known, but stocks have diminished considerably in size. Similar stocks held by the Yawata (Government) Iron Works in Kyushu, at the commencement of the year, were, according to the *Japan Weekly*, estimated at 300,000 tons, and these have almost entirely been disposed of at an average monthly consumption of 20,000 tons. Considerable price concessions were necessary to move this stock. Much of it, comprising heavy and light rails, was eagerly picked up by the government railways and by industrial operators. A resulting scarcity in some shapes and sizes of steel is evident.

Activity is particularly centered in the several hydro-electric power undertakings which have been under way since last year. In Japan proper three operations are planned for, having as their objective the furnishing of power, through three distinct lines of transmission, to the cities of Kobe, Osaka and Kyoto to the south and Yokohama and Tokyo to the north. Ultimately the three operations will be merged into one company. Much of the material required for this work, such as transmission towers and cables, will be of American manufacture. Building on a large scale is under way. At Tokyo an American firm has the contract for the construction and erection of three steel-frame office buildings, all of the steel materials to be of American manufacture. The Yokohama Specie Bank has purchased the steel in the United States for its new bank and office building for Tokyo.

There is a demand for black sheets of thin gauge for galvanizing in Japanese plants; for tin plate to supply the salmon canning factories at Hakodate; for wire rods for rope and cable manufacture, and other wire products; and for electrical sheets for Japanese-made motors, dynamos, and transformers.

Prices of steel commodities are believed to have reached bottom and will be influenced for a time by the movements in German quotations. German steel bars, according to the *Japan Chronicle*, advanced in price the early part of September Y.15 to Y.128 per ton (2,240 pounds), while black sheets moved up Y.25 to Y.163 per ton.

The following table presents a comparison of Japanese imports of iron and steel products during August 1920, with these for August of this year:

Japan's Imports of Iron and Steel in August.

Articles	August 1920. Yen	August 1921. Yen
Pig iron	1,843,000	784,000
Steel rods, bars, plates, sheets, and other	17,863,000	7,030,000
Rails	1,344,000	923,000
Total	21,050,000	8,737,000

Each group of items shared in the decline, the average decrease amounting to 58 per cent.

Engineering, Financial, Industrial and Commercial News

AGRICULTURAL

Nantungchow to have a Perfect Agricultural Experiment Ground.—The five salt refinery companies in Nantungchow—Dah-yue, Dah-lai, Dah-foong, Hua-chen and Dah-yu-tsing—have jointly proposed the establishment of a perfect agricultural experiment ground in the district to work for the improvement of China's agriculture. It is reported that a fund has been advanced by some Chinese banks in Shanghai and that Prof. Kao Tan-ching and Prof. Yuan Chung-chow have been asked to take charge of the organization.

Cotton Production of Kiangsu.—The following report prepared by the Chinese Cotton Mill Owners' Association, Shanghai, is quoted from the *Shanghai Journal of Commerce* :—

Year	Kiangsu Province	Nantungchow District
1918	4,128,696 piculs	2,142,855 piculs
1919	2,763,160 ,,	1,500,000 ,,
1920	3,022,210 ,,	1,030,000 ,,

Japanese Concession, Borneo.—A Japanese company has obtained a concession of 35,000,000 acres in Borneo for the cultivation, with the help of Japanese settlers, of coffee, rubber, coconut and rice.

AUTOMOBILE

Auto Bus Service, Soochow.—Mr. Pan Loo-kao is organizing an automobile transportation company at Soochow with a capital of $200,000. A petition has been submitted to the authorities for approval and registration.

Chinese Manufacture Automobiles.—The Yangtze Machinery Works has turned out an automobile, which, when compared in quality and workmanship, is stated to be in no way inferior to foreign makes. Patent rights have been obtained from the ministry of agriculture and commerce. The company now intends to enter into competition for the China market with other manufacturers.—*Bureau of Economic Information.*

Shanghai-Taichong Auto Bus Service.—The automobile road from Shanghai to Tai-chong has been completed, though several important bridges in the central part of the line remain to be built. Great efforts, however, are being made to finish the uncompleted work within forty days, work which was delayed by the continuous rain. Automobiles ordered from abroad have already arrived at Shanghai and office buildings, car sheds, warehouses and station buildings are expected to be ready at the end of November. The service will be inaugurated within the year and at the present the motor-men and conductors are busily engaged in driving for practice.

Haining-Changan Automobile Road Proposed.—Messrs. Wong Zu-foo and Tsai Tso-hsu, gentry of Hai-ning, Chekiang, have proposed to construct a motor road from Hai-ning to Chang-an via Dah-chin-chang, Yang-chiar-chong, Wu-chiar-to and King-chiar-jao measuring about 23 *li* with three stations to be established on the line. The transportation service will be inaugurated with two passenger auto-buses and two freight buses.

AVIATION

New Aeroplanes for China.—Sixty aeroplanes ordered by the Peking aeronautical bureau from Messrs. Vickers & Co. have arrived at Shanghai.

Air-Service from Peking to the Great Wall.—The Aeronautical Department has formulated a plan for air-service from Peking to the Great Wall carrying passengers. The flights will be started at 9.30 a.m. of October 27, and henceforth service will be operated on Tuesdays and Thursdays while Great Wall touring on Wednesdays. The fare is charged by time instead of by distance, Peking flight for half an hour at $15 and Great Wall travelling for 1½ hours at $30. The whole journey from the Wall to the capital takes only 1½ hourse.

BRIDGES

Railway Bridges for China.—The Chinese government has authorized the Netherland Syndicate, Ltd., for China at Amsterdam to place orders in Holland for the construction of 150 railway bridges of various dimensions. The orders will be given to the firm of De Vries Robbe & Co., at Gorinchem and to the Construction Labor Yards, Ltd., formerly de Croo & Brauns, Amsterdam. These bridges are to be constructed for the eastern part of the Lunghai railway, which is now being built under the direction of three Holland engineers.

Siamese Railway Bridge Specifications.—Tender forms, including general terms, and specifications for the supply of superstructures of 8 steel bridges for the Siamese State Railways are en route to the bureau, cables American Consul James P. Davis from Bangkok. The total length will be about 600 metres. The arrival and availability of the forms and specifications will be announced later.—*Commercial Reports.*

BUILDINGS

Railway Hotel, Tsinan.—It is reported that a railway hotel will be established at Tsinan by the Tientsin-Pukow Railway Administration.

Building Company, Mukden.—The Mukden Building Co., architects and contractors, organized by Messrs. Wang Kan-chen and Pang Ching-yao with a capital of $100,000 Mukden currency, has been established.

New Girls' School: Tokyo.—The Tokyo Jogakkan Girls' School will build on a new site at a cost of Y.300,000.

New Work in Nantungchow.—As the removal of Nantungchow city wall is nearing completion, the construction department at Nantungchow has formulated a plan for erecting new market buildings on the old city foundation and preparations for the work are being made by the department.

Hangchow to have Railway Hotel.—The Shanghai-Hangchow-Ningpo Railway administration has been authorized by the ministry of communications to build an up-to-date railway hotel at the West Lake, Hangchow, which is estimated to cost $30,000.

COMMERCIAL

Harbin Agriculture Trading Co.—Reports from Peking state that General Chang Tso-lin has purchased control of the Agriculture Trading Company of Harbin by paying $500,000, and is planning to expand the company by investing an additional $2,000,000.

Chinese Patents.—Chen Hsiang-yuan, of the Chung Hwa Domestic Industrial Co., Ltd., has petitioned the ministry of agriculture and commerce for monopoly rights of the company's invention of a process for manufacturing magnesium carbonate from wastes.

China Commercial Attaches.—The ministry of commerce and agriculture has pointed out to the cabinet that, in view of the fact that China's trade interests abroad are continually increasing and of the great field for their further development, commercial attachés should be appointed not only in the great countries but specially in those which have become treaty powers since the war.

The Ibaraki Smokeless Coal Selling Co. with a capital of Y.2,000,000, quarter paid-up, was established recently.

DEVELOPMENT

Plan of the Ministry of Agriculture and Commerce for Development of China's Fishery.—With a view to placing China's fishing industry on a proper footing, the ministry of agriculture and commerce is preparing to take the following measures :—

(1) To organize a fishing training school at Chefoo, Shantung, in addition to other two such institutions already established at Ding-hai, Chekiang, and Haichow, Kiangsu, and to send several qualified students abroad every year to pursue higher study in fishery.

(2) To establish fishing guilds in the maritime provinces for mutual advantages of fishermen and fishmongers and to draw up a set of regulations governing such organizations.

(3) T establish fishing markets at important cities along the coast, only one market being allowed within a certain designated area, and regulations for such organizations to be set up.

Sugar and Cotton Industries.—The Mitsubishi Company is said to be interested in the development of the sugar and cotton spinning industries in Manchuria as a result of a recent visit made by Boron Iwasaki.

New Companies Under Organization.—According to latest report, the following corporations are being organized :

Kiu Kee Lumber Co., Ltd., Shanghai.
Yue Chong Stock and Produce Exchange, Kiangsi.
Ningpo Flour Exchange, Chekiang.
Hankow Cotton Exchange, Hupeh.

Shantung Industrial Commissioner Fulfils His Duty.—Regarding the development of industry in the province of Shantung, Mr. Dien Pu-zan, industrial commissioner at Tsinan, has decided to take the following measures :—

(1) Encouraging people to exploit agricultural lands so as to bring them under cultivation.

(2) Operating mineral resources by subscribing a sufficient capital among the people.

(3) Taking up fishery along the coasts of the province so as to place the fishing industry on a proper footing.

(4) Encouraging forestry so as to cultivate timber on a large scale.

The Future Prosperity of Woosung.—Commenting on the improvement work of Woosung, the *Shanghai Journal of Commerce* calls the coast town China's Manchester, for there is good reason to believe its possibly becoming a commercial as well as a manufacturing centre at the mouth of Whangpoo river in a few years. The extensive scheme which involves constructing roads, erecting bridges, laying out tramways, etc., has been formulated by an experienced foreign surveyor, and the work is expected to be completely carried out within ten years. Among the new successful works are the completion of two cotton mills, Hua Foong and Dah Chung Hua, and the construction of a modern road at the expense of the two mentioned factories.

New Companies Under Organization.—According to report, the following corporations are being organized :—

- Dung Woo Shun Warehouse, Ltd., Chihli.
- Mih Shan Coal Mining Co., Kirin.
- Peking Tramway Co., Peking, by Mr. Chu Chi-chien.
- Chinese Citizens' Commercial and Savings Bank, by Mr. Sze Lien-yuan.

Registration of New Corporations.—According to latest report, the following corporations have been officially registered with the ministry of agriculture and commerce :—

- Kung Lee Coal Mining Co., established by Mr. Feng Kung-doo.
- Yue Tung Coal Mining Co., in Shantung, established by Mr. Lee Hai-kwan.
- Tseng Nih Licorice Co., Peking.
- Dah Dung Trading Co., established by Mr. Sze Chi-tai.

EDUCATION

Chinese Technical University.—The Chiaotung (communications) University has been formally opened. This new institution will unify and improve the technical education that has been afforded in the past by the Railway Administration College, the Postal and Telegraph College, and the Shanghai and Tangshan Colleges.

ELECTRICITY

Electric Light Plant, Chinghai.—A new electric light plant is being organized at Chinghai, Chekiang, by Mr. Wang Ying-kwan with a capital of $50,000.

Electric Light Plant, Sing-Dung-Ching.—Messrs. Chen Bai-chen, Chu Ching-mo, Kiang Yung-sze and Chen Foo-kang are organizing the Tseng Sing Electric Light Plant and the Tseng Sing Rice Husking Co. with a capital of $25,000.

Electric Light Plant, Sung-Chiar-Tan.—The Pang Yih Electric Light Plant at Sung-chiar-tan, Manchuria, is doing a very profitable business, stimulated by the recent prosperity of the town. In last spring there were more than 7,000 lamps installed which have increased. To meet with the increasing demand the plant has recently placed an order for a large quantity of electrical supplies.

A New Electrical Venture.—Messrs. Tsao Yu-iin and Chang Tsung-hsiang and other former officials have organized a company, with a capital of $1,500,000, divided into 3,000 shares to manufacture electrical supplies.

Electric Plants in China.—Up to only a few years ago artificial light in China for the purpose of illumination was supplied by the use of candles and oil lamps. The glow of electric incandescence has since penetrated all parts of the country, and to-day there are electric light plants helping to dissipate the mist of night in at least two hundred cities in the eighteen provinces of China proper. These plants are being taxed beyond their capacity and are in need of additional equipment, for the Chinese people are awake to the great value and convenience of electric power. Manufacturers of electrical goods will do well to give more thought and attention to the Chinese market for their products.

An Electrical and Engineering Co. Established in Yangchow.—Mr. Feng Tze-chung is organizing the Wai Kong Electrical and Engineering Co. at Tu-tze-char, Yangchow, where there prevails a great need for electric supplies and engineering tools. The company has been duly registered with the ministry of agriculture and commerce and will be opened for business soon.

Import of Electrical Supplies to China.—In 1920 the total importation of electrical tools and supplies to Shanghai amounted to Tls. 6,200,000, of which Tls. 2,624, 324 represented Japanese goods, Tls. 2,012,397 American goods, Tls. 1,000,-000 British goods and about Tls. 300,000 each represented Hongkong and Canadian manufactures. For the same year, their import to Canton stood at about Tls. 200,000, to Tientsin at 959,000, to Tsingtao at 160,000 and to Hankow at 38,000; while to Dairen at 1,578,777 which indicated a decrease of Tls. 100,000 as against the previous year.

In this connection, it must be remembered that in 1900 the import of these articles to Shanghai amounted only to Tls. 28,216 and in 1890 the total import to China only to Tls. 20,000, while in 1880 there was no such importation to China at all. The above figures show the rapid progress in China's electrical activities.

New Electrical Fan Invented by Chinese.—Mr. Woo Teh shai, graduate of the Central Technical College, Japan, has invented a new type 6-lb. electrical fan, 8-in. in height. A special feature of the new invention is that it revolves about 300 times more than a foreign machine does in every minute, while consuming equal quantity of electric power. The machine has been examined and certified by the Shanghai Industrial and Commercial Society and an application to the ministry of agriculture and commerce for registration will be made.

Two Electric Light Plants being Organized.—Applications to the ministries of communications and agriculture and commerce have been made by Mr. Hsu Tze-zing and Mr. Dao Chen-foo respectively for organizing an electric light plant at Sun-fong, Chihli, and Ya-chen, Kiangsu.

Westinghouse Gets Japanese Order.—The Westinghouse Electric International Company recently announced that it has received an order for two electric freight locomotives from the imperial government of Japan, to be used in the Tokio district. These locomotives, which will weigh sixty-three tons and have a capacity of 1,000 horse-power each, will operate on the 1,500 volt direct-current system.

ENGINEERING

A New Machine Invented by Chinese.—Mr. Chang Hua-shai, manager of Hua-kee Match-Stick Factory, Tangshan, has invented a new machine for manufacturing match sticks and match boxes. The new invention has been submitted to ministry of agriculture and commerce with a request that a patent be granted.

Engineering Works, Peking.—Messrs. Wu Zung-shih and Woo Shao-pang are establishing the Shun Nih Engineering Works in Peking to manufacture nails and machineries. A capital of $150,000 has been raised and a lot of land covering 24 *mow* has been purchased.

EXPORTS

China's Trade with Germany.—In August, 1921, the following goods were exported to Germany from this country :—

Sesamum seed	16,350	piculs
Peanut	4,100	„
Raw hides	2,088	„
Fur	7,716	piculs
White and yellow of eggs	3,843	„
Antimony	1,344	„
Sheep's wool	114	„
Red tea	314	„
Human hair	4	„

Export of China's Hides.—In last August, the export of sheepskin from China amounted to 105,871 pieces as against 50,922 for the corresponding month last year. For the whole year of 1920, its export stood at H.K. Tls. 8,112,526 covering 9,966,633 pieces of sheepskin, of which 857,031 were shipped to U.S., 10,800 to Italy and 3,000 to Japan.

For the period from July 1, 1920, to August 30, 1921, 1,184 piculs of cows' hides were exported to Japan from China, 3,517 to U.S. (?), 2,658 to Germany, 641 to Italy, 997 to U.S (?), 353 to Copenhagen and 1,425 to the other principal ports in Europe and America.

August Export From China.—During these past few years China's export of ducks and geese feathers has always amounted to something more than Tls. 1,000,000, a large proportion of which were exported from the ports of Shanghai and Wuhu. As to the area of consumption, about 15 per cent. has been distributed to England, 10 per cent. to Holland, 30 per cent. to U.S. and two-fifths to Hongkong. In August 1921 exports stood at 1,,296 piculs, distributed os follows:

England	595	piculs
Holland	101	„
Germany	114	„
U.S.A.	437	„
Japan	49	„
	1,296	piculs

During the same month, the export of raveled silk amounted to 9,089 piculs, details as follows:

Marseilles	5,324	piculs
U.S.A.	1,994	„
Japan	996	„
London	605	„
Italy	174	„
Liverpool	36	„
	9,029	piculs

COMMERCIAL FINANCE

Mining Bank being Organized.—It is reported that a mining bank with an object to give financial assistance to mining industry is being organized with a capital of $600,000 by Mr. Chao Wen-ping, a leading merchant in Dah-yue-hsien, Kiangsi.

A Large Exchange being Organized. Hankow.—It is reported that an international exchange to be jointly managed by Chinese and Japanese is being organized in Hankow. The new company will be capitalized at $20,000,000 and will transact stock and produce exchange and import and export business.

A New Bank being Organized, Shanghai.—Several Ningpo merchants such as Messrs. Hung Ching-shan, Chien Tze-chen and Hung Dyau-chen are establishing the Co-operative Bank for the People in Shanghai with a capital of $500,000.

A New Tientsin Exchange.—The Tientsin Produce and Stock Exchange held a splendid opening ceremony recently, with a large number of Japanese, Chinese officials and private persons present.

GOVERNMENT FINANCE

The French Loan still Unsettled.—The Peking *Yishihpao* says that in connection with the $3,000,000 loan from the Banque d'Indo-Chine, the matter is still unsettled because the French leaders demand reliable security which has not been pledged for other foreign loans by the ministry of finance.

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Loan for Chinese Eastern Railway.—The Chinese banking group is negotiating with General Sung Hsiao-lien, director-general of the Chinese Eastern Railway, for a loan of $35,000,000 to be used for the reorganization of the Chinese Eastern Railway. The loan is said to bear twelve per cent. interest, and it will be secured by the proceeds of the railway, but contrary to the usual custom, no discount will be charged. The Chinese banks are also reported to have declared that if this sum does not prove sufficient for the reorganization work they will be able to finance another loan to the railway.

The Hankow Port Loan.—With reference to the loan for the construction of a commercial port at Hankow, Tang Hsiang-ming, who is now on a visit to Peking, as a result of negotiations with the central government, has cancelled the loan with Samuel & Company and has, it is reported, concluded a new loan with a French merchant.—*Eastern News Agency.*

Summary of Latest Government Loans.—Reports from a reliable source state that a loan of $400,000 was signed between the Peking government and the bank of agriculture and commerce just before the Chinese mid-autumn festival, after which $500,000 from Tung Lu Bank and $40,000 from another bank were borrowed. Besides a number of foreign loans in the course of discussion, there are more than twenty domestic loans under negotiation at present, the amounts of which range from $60,000 to $500,000 with an average interest of about 20 per cent.

Proposed Aerial Loan Reported.—It is reported that Mr. Pan Ju-ying, chief of the aeronautical department, is negotiating a loan with the Vickers Co. of England of £20,000,000 sterling, to be devoted to establishing an aeronautical factory in Peking. Mr. Pan is anxious to get a small loan of £200,000 first from the company in order to relieve the pecuniary difficulty of the department.

FISHERIES

Exporting Canned Salmon.—According to a report received from Tokio, the salmon fishing along the eastern coast of Kamchatka, which was started on June 7, proved very satisfactory. The catch made by the Japan-Russia Fishing Company and the Tsutsumi Shokai during the month of June amounted to about 160,000 cases. Of this amount 124,000 cases of beni sake (a kind of salmon) and 5,200 cases of king salmon were exported in tinned form, while the remainder were exported raw. Compared with the same period of last year the figures represent an increase of about 40,000 cases. It is also reported that crabs now being tinned on the western coast of Kamchatka for export will reach about 6,000 cases.

FORESTRY

Lumber in Kirin and Heilungkiang.—Within the provinces of Kirin and Heilungkiang are scattered dense forests, and General Sun Li-chen and General Woo Tsing-sun, tuchuns of Kirin and Heilungkiang respectively, will exploit these resources. To this end an investigation is being made now by the forestry departments of Kirin and Heilungkiang.

GENERAL

Hongkong Enterprise.—Negotiations are progressing between the Hongkong Hotel Co., Ltd., the Dairy Farm, Ice and Cold Storage Co., Ltd., and the Wiseman Café, Ltd., with a view to securing a unification of interests.

New Corporations Under Organization.—According to report, the following companies are being organized :—

Fu Sing Electric Light Plant, Chen-shih, Kiangsu, by Mr. Feng Ngao.
The Citizens' Savings Bank of China by Mr. Sze Lien-yuan.
Yah Shun Steam Launch Navigation Co.
Ting Foong Co., by Mr. Wang Kan.
Lustring Manufacturing Co., Shanghai, by Mr. Yang Shao-cheun.

Registration of New Corporations.—It is officially reported that the Yah Yih Cotton Co., Tientsin, was recently registered with the ministry of agriculture and commerce.

Carlowitz & Co. Back on Old Field.—The first German firm of importance which has resumed its business with the Chinese after the war is the well-known firm of Carlowitz & Company in Canton. With the co-operation of its Chinese friends, this German firm has already received many orders for machinery, etc., from Germany to be delivered next spring. The Carlowitz houses in Tientsin and Shanghai will also be reopened shortly because their Cantonese compradores are going to rejoin their firms now. The Chinese business men are said to welcome the presence of the Germans in Canton so that it is expected that the energetic Teuton will regain his former commercial prosperity in China within the course of the next few years.

German Views on China Business.—China is now passing through a period of transition from a purely agricultural to an industrial country, and for many years to come is likely to prove a good market for all kinds of machinery. In 1913 the imports of these goods were valued at Tls. 4,600,000, while in 1920 they had increased to 22,300,000.

Electrical plant is very much in request .As far back as 1911 towns of no more than 30,000 inhabitants in Southern China were fitted out with electrical plant, and developments in this direction have increased steadily.

Imports of aniline dyes have increased by Tls. 7,700,000, compared with 1913 figures, and Germany will, to all appearances, reconquer this market.

There is a great demand for rolling stock, imports of which were completely stopped during the war. The construction of railway lines does not appear to be in full swing yet.

China should be a promising market for beers and spirits. The Chinese have even embarked on viticulture at Chefoo and Peking.

The British flag again heads the list with regard to shipping. Out of a total tonnage of 104 millions entering Chinese harbors Great Britain leads with 40 million tons, Japan following with 28 million tons.—*Frankfurter Zeitung.*

INDUSTRIAL

The Otari Cement Company Ltd. was established recently at Otari, Iwate prefecture, with a capital of Y.2,000,000.

A 70 Million Yen Mill.—Rumours of a colossal undertaking by a Japanese firm are reported in the vernacular newspaper. It is stated that a certain Japanese firm has raised 70 million yen for the establishment of a spinning mill in Shanghai for the manufacture of cotton, yarn, thread, piece goods silk and woollen goods, etc. The mill will require 1,000 *mow* of land and will employ 30,000 workmen.

White Phosphorus Matches in Japan.—The board of trade have received translation of a law (No. 6) recently passed by the Japanese diet which prohibits the manufacture, sale, importation and transport of matches containing yellow (white) phosphorus. The Law is to take effect on July 1, 1922, but a further period of twelve months from that date will be allowed for the disposal of sulphur matches made, imported or transported from one part of Japanese territory to another prior to the enforcement of the Law.

More Chinese Enterprise, Hongkong.—The On Lok Yuen Restaurant, which was recently incorporated into a public company, will shortly include amongst its activities the business of a confectioner, biscuit maker and manufacturer of ice, according to an announcement made to a representative of the *Telegraph* recently. A large factory, three storeys in height, will be built on a site recently acquired at Watson Street, Causeway Bay, the cost being estimated at a sum closely approaching $100,000. Mr. Cheong Kat Shing, manager of the company, who has gone to America to make arrangements for the shipment of the machinery, is expected to return to colony early next month, when it is expected that the erection of the factory will be commenced without delay. The factory when completed, will be a welcome departure from the usual drab type of such buildings, as it will possess an ornamental exterior appearance. Messrs. Palmer and Turner are the architects.

Paper Mill Machinery.—The paper manufacturing industry in China has not yet been developed to the extent which would render it unnecessary for her to import annually the vast quantity of all kinds of paper from foreign countries, especially from Japan. The development of her other industries along modern lines makes it imperative that China should also give more thought to facilities for the production of paper of every description, more particularly those for the milling of corrugated and newsprint varieties. There are, of course, modern paper mills in China, and they are doing a prosperous business. Take the small cardboard factory in Soochow, for instance; according to a report recently brought to our attention, the Soochow factory is producing about twelve tons of cardboard each day and realizing a monthly net profit of about $20,000. There is no sustained effort on the part of American manufacturers of paper milling machinery to create a market for their goods in China. But that a demand exists or should exist is to be inferred from the fact that millions of dollars worth of the finished products of paper milling machinery are imported into China each year.

New Cotton Mill for Japan.—It is announced that a new cotton mill, capitalized at $2,000,000, is about to be constructed in one of the outlying districts of Canton. The principal object of the new concern is to manufacture native goods for Chinese consumption.

Extension of Yu Chung Cotton Mill.—At the last shareholders' meeting of the Yu Chung Cotton Spinning and Weaving Factory, Wuhu, it was unanimously decided to install an additional equipment of 5,000 spindles, costing about $273,000, build a warehouse costing $60,000, purchase some additional machinery costing $47,000 and increase its capital from $800,000 to $1,000,000.

A Sino-Foreign Paper Mill.—It is reported that some native merchants have associated themselves with several American and British capitalists in the organization of a large paper mill in North Manchuria with a capital of $2,000,000.

Match Factory under Organization, Yinkow (Newchwang).—A match factory is being established at Yinkow by Mr. Chang Ju-chen and several others. A site for the factory building has been chosen in the neighborhood of Dai-chartung and a capital of $500,000 is being collected.

Enamel Ware Manufacturing Co., Shantung.—Two returned students, Mr. Li Wai-shuan and Mr. Chang Hung chuan are organizing an enamel ware manufacturing company at Tsinan, Shantung, with a capital of $100,000.

Chinese Yarn Holder Factory.—The China First Cylindric Yarn Holder Manufacturing Co., recently established at Chapei, Shanghai, is meeting with success. The holders, made of Chekiang hardwoood, are far superior to those of foreign manufacture.

First Factory in Hu-tze Chekiang.—A certain Mr. Chu is organizing the Yu Yuan Cloth Weaving Factory at Hu-tze, Chekiang, with a capital of $50,000, the organization being the first of any industrial plant ever established in the city.

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Concrete reinforcing bars, triangle mesh, expanded metal
Plumbing, heating and wiring devices
Steel sash, steel casements, vault doors
Ice-making plants

GENERAL IMPORTERS AND EXPORTERS

New Flour Mill, Tsinan.—Hua King Flour Mill is being organized at Tsinan by Mr. Chang Tsan-chen with a capital of $400,000, half paid up, and its registration has been officially made with the ministry of agriculture and commerce.

Largest Factory in Shanghai.—It is reported that several Japanese capitalists are establishing a gigantic factory, perhaps the largest in Shanghai, at E-chow-dong, Woosung, with a capital of Y. 70,000,000. The whole factory will occupy a site of about 1,000 *mow* while for the time being buildings covering 300 *mow* have been in the course of construction. This industrial plant, when completed, will employ 30,000 employees, and its activities are to cover cotton and silk spinning, weaving and dyeing, while an extensive scheme for building up a market adjoining the factory is also being planned.

A Large Lace Company Established, Chekiang.—The Sino-American Lace Co. has been established at Ling-ngan-shang, Chin-hai, by an American capitalist, Mr. Harmet (translated according to pronunciation of Chinese characters), with a native merchant, Mr. Wang Yih-sun. The company has a capital of $10,000 under Sino-American management, Mr. Wang acting as compradore.

Extension of Yung Lee Alkali Manufacturing Co.—At the last shareholders' meeting of the Yung Lee Alkali Manufacturing Co., Tientsin, it was decided to increase its capital by $600,000 in order to enable the factory to increase its producing capacity.

Soap Factory, Chinkiang.—The Tseng Hua Soap Manufacturing Co. is being organized at Chinkiang by Mr. King. When the new company opens, Chinkiang will have six soap factories.

Registration of Cotton Spinning and Weaving Factory.—It is officially reported that the Tseng Tai Cotton Spinning and Weaving Factory, Shanghai, which was promoted by Mr. Lee Pai-pao with a capital of $800,000, has been duly registered with the ministry of agriculture and commerce.

Silk Textile Plant Opened, Chinkiang.—The Chen Chong Silk Textile Plant has been established at Chinkiang by Mr. Loh Sho-pu, a wealthy merchant in the city. The new plant is operated by about 60 men and 30 women laborers with 44 weaving machines, and three times as many workers as at present will be employed when another 100 machines have been completely installed. It occupies a site of over 20 *mow* and is capitalized at $120,000.

New Cotton Mills for Tientsin.—Cotton mills seems to be in fashion in Tientsin nowadays; one is in the course of construction that will contain 56,000 spindles when completed.

Several others are also under construction so that in a few years time much manufacture of cotton goods may be expected to be done in this neighborhood.

While the militarists continue to squabble and bleed the government the more peaceful people, the merchants, are quietly going ahead with their schemes for development.

Investment by Java Merchant.—Uy Yik-chu, a well known sugar merchant in Java, is planning to start a large cotton mill in Shanghai and a silk factory in Chekiang, a tea factory in Fukien and a sugar mill in Canton with a capital of $40,000,000, according to the *Manila Daily Bulletin*. Mr. Uy has lately established a Chinese bank in Shanghai and is one of the large stockholders in the China Banking Corporation in Manila.

Extension of Heng Doh Cotton Mill.—The Heng Dah Cotton Spinning and Weaving Factory, Yang-sze-hsiang, has announced the increase of its capital by $300,000 and the installation of 5,000 additional spindles.

Mukden Cotton Mill Expands.—Finding its present premises too small, the Cotton Spinning and Weaving Factory at Shiao-si-pai-men, Mukden, is planning to get a new site of 100 *mow* near the Peking-Mukden railway station.

Industrial Plants, Chekiang.—According to a report prepared by the industrial commissioner at Hangchow, there are in Chekiang about 2,500 factories, 218 silk textile plants, 1,800 silk textiles companies and 6,718 weaving works, aggregating a total capital of $64,750,000 with over 146,000 staff and workmen.

Cement Plant, Wusieh.—The Tai-hu Cement Company is being organized at Wusieh by Messrs Yih Kung-tao, Sih Nan-ming, Chao Kien-chun, Chen Tseng-tsan and Liu Yue-chang. The new company has been officially registered with the ministry of agriculture and commerce, capitalized at $2,500,000 in 50,000 shares of $50 each.

Sugar Refinery Planned, Mukden.—It is reported that some Chinese merchants are planning the establishment of a sugar refinery in Mukden with a view to competing with the South Manchuria Sugar Manufacturing Co., organized by Japanese.

New Cotton Mill, Hsuchow.—The Zung Shih Cotton Spinning Mill is being organized by Mr. Liu Soong-ngai at Hsuchow, where there is a yearly yield of millions of catties of cotton that can be utilized for yarn. The new mill is to be capitalized at $100,000.

Silk Weaving Plant, Shantung.—Mr. Wang Shou-chen is organizing the Lih Chong Silk Mill at Lung-shan-ching, Shantung, with a capital of $100,000. The new factory is to be equipped along the same lines as the Yue Woo silk textile plant of Hangchow.

Hosiery Factories in Canton.—It is reported that there are no fever than 50 silk hosiery factories in Canton. Most of them employ 30 to 50 workers; while the larger ones employ more than 100 workers. Women and girls form the larger number of employees in these factories. Most of whom earn 60 cents to $1 a day.

Ice Factory : Canton.—Another ice factory is projected for the French Concession, Shameen. This factory claims that it can manufacture 1,200-lb. of ice in an hour the same output as that of the Chinese Ice Factory. The building will be completed soon, and machinery ready for operation in a few months.

Japanese Spinning Mill, Shanghai.—It is reported that a Japanese firm has raised 70 million yen for the establishment of a spinning mill in Shanghai for the manufacture of cotton, yarn, thread, piece goods, silk and woollen goods, etc. The mill will require 1,000 *mow* of land and employ 30,000 workmen.

New Soap Works, Chefoo.—A new company under the name of "Yuah Chen Tai Soap Manufacturing Co." is to be established in Chefoo. Its capital is $50,000.

New Chinese Machinery Co.—The Ching Hsin Iron Works of Hsuchow organized by New Ziang-ting was opened recently. It manufactures weaving machines, cotton gins and printing machines.

Chemical Factory, Tsinan.—A factory is to be established at Tsinan for the manufacture of sulphuric and nitric acids.

Chinese Patents.—Chen Hsiang-yuan, of the Chung Chung Hwa Domestic Industrial Co., Ltd., has petitioned the ministry of agriculture and commerce for monopoly rights of the company's invention of a process of manufacturing magnesium carbonate from wastes. The application has been granted.

Tyres made in the F.M.S.—Messrs. Mace, Hall & Co. are making motor car and bicycle tyres at Ipoh, beginning with the Ford size.

The Commercial Port of Hai-chow.—Mr. Chao Chang-yung, a gentleman of Hai-chow, has requested the ministries of agriculture and commerce and communications that a waterworks company and an electric light plant should be authorized for operation by the Hai-chow port work bureau, and the proposal has been sanctioned by the authorities concerned.

Egg Products Co. Established, Shanghai.—The Fu Ling Egg Products Manufacturing Co. has been opened in Shanghai with a capital of $40,000. The principal of the new company is Mr. Chen Kuo-ping, a Cantonese merchant, and application for registration has been made to the Shanghai magistrate.

North-West Industrial Trading Co. Being Organized.—The Si-Pei or North-West Industrial Trading Co. is being organized in Peking by some Chinese and American interests. The company was promoted by Mr. Har Han-chong and General Ma Fu-hsiang and General Li Yuan-heng, former president of China, are said to have associated themselves with the undertaking. A certain foreigner is also participating in the enterprise by investing $5,000,000 and on the part of Chinese capitalists a same amount has been subscribed.

Some Important Factories in Nantungchow.—The following brief account of some important factories in Nantungchow may be of interest to those who have a mind to know the present industries in the model city of China. Among all the plants and mills in the city the largest is the Dah Sung Cotton Spinning and Weaving Factory which is capitalized at Tls. 2,500,000. At present it is equipped with 65,380 spindles and 480 loooms with an annual production of 47,000 bales of yarn and 130,000 pieces of cloth. The average consumption of native and American cotton every year amounts to approximately 170,000 piculs. During last year, a net profit of about Tls. 2,000,000 was made and an extension work of the factory is being planned at present. A textile plant bearing the same name as the cotton mill was established in 1915 with a capital of $22,000. It has 60 weaving machines and produces 80,000 woolen blankets annually.

The Foo Sing Flour Mill situated at Tang-za, which turns out about 650,000 bags of flour yearly, is doing a good business. A net profit of $130,000 was reported to have been made last year.

The Tung Sui Match Factory which is located at Tien-Sun-Kung is also worth mentioning. It was founded last spring with a capital of $200,000 and its products bearing the different brands of "Nantung," "Soldier" and "Wu-foo" have enjoyed a ready sale throughout China.

An oil mill known as Kwong Sung is also doing a very profitable business every year and has many branches established outports. The principal products of the mill are bean oil and cotton oil, the latter being comparatively inferior in quantity. With a view to improving the second-class products, an experienced German chemist has been employed and a good success in the work is reported to have been made.

MACHINERY

Chinese Machinery Co., Canton.—The Ching Hsin Iron Works of Hsuchow organized by New Ziangting was opened recently. It manufactures weaving machines, cotton gins and printing machines.

MINING

Coal Mining to Shantung.—The bureau of economic information says : It is reported in the vernacular press that the coal mine at Tzechuan (Yutingchen) Shantung, is to be operated by Sino-Japanese enterprise with a capital of $6,000,000, which has been equally subscribed by the Shantung provincial government and various Japanese firms. The mine has an area of about 600 *li*, and is reputed to possess rich seams. These are 7-ft. 5-in. in width, and run in parallel lines in 24 layers. The output,

if properly worked, is capable of supplying all the needs of the province.

A New Mine in Kiangsu.—It is reported that an aluminium mine has been discovered at Haichow, Kiangsu.

A Coal Mining Co. being Organized, Shantung.—Mr. Chen Sze-chee is organizing a coal mine company at Chee-chow, Shantung, with a capital of 200,000 to operate on the coal deposit at Lung-tan, Sing-tai-hsien, which has been proved to be quite plentiful and fine in quality.

Mihshan Coal Mine, Kirin.—The civil governor of Kirin has notified the ministry of agriculture and commerce that the merchants of the province propose to open the Mih Shan coal mines, and asks for its approval.

Coal Mine, Manchuria.—Mr: Koo Van-ching has been authorized by the industrial commissioner of Kirin to operate the coal mine at Ma-ping-kew of Peng-chee, Manchuria. He is supported by Mr. Chao Tsing-shan, who has promised to invest $20,000 in the undertaking.

New Mining Company, Mukden.—A Sino-Japanese corporation known as the "North-Eastern Company" in Fengtien has been established with a capital of Y.20,000,000 for mining, afforestation and agricultural enterprises.

New Discovery of Coal Mine, Shantung.—It is reported that a new coal mine has been recently discovered at Chiang-chun-ker, Pao-shan. Its quality is well spoken of, and a certain Mr. Chang has been authorized to develop the new property by order of the ministry of agriculture and commerce.

Mines to be Developed.—By order of the ministry of agriculture and commerce, Mr. Sui Nan-ping has been permitted to operate the coal mine at Yue-shu-chuen in Yen-chang, Kirin, and Mr. Chow Kai-chen to operate the gold mine in front of Yue hill, Tung-hai-hsien.

Opening of Mineral Resources Permitted.—By order of the ministry of agriculture and commerce, the following mines are granted to operate :—

Mine	Location	Area	Mining Merchant
Coal	Shih-chai-ling & Mai-lung-kong in Nan-ling-hsien, Anhwei	570 mow	Fong Ting-ying
Coal	Tung-tao-chung in Fan-chang-hsien, Anhwei	—	Yao Shu-yue
Coal	Char-char-tsu in Dahtung, Shansi	—	Hsu Shih-yu
Coal	Pei-chuan-dee in Tsing-chen, Shansi	—	Hur Dong-foong
Coal	Soo-chong in Tsing-chen, Shansi ...	—	Van Tseng-sung

Yenki Rich in Minerials.—Yenki, in Kirin, China, possesses rich mineral resources, particularly gold and silver, say advices from Peking. The silver mine in Tienpaoshan was first operated by a Honanese, but the enterprise failed and the Japanese gained control through negotiation of a loan of $60,000. Effort was made by the Chinese to regain possession, but the Japanese demanded $3,000,000 compensation. Eventually agreement was reached whereby the undertaking was operated under Sino-Japanese auspices. The value of the daily silver output is reported by the Japanese to be $30,000.

The gold mines in the Yenki district are worked by the Chinese. Owing to the primitive methods employed and the small capital, there is plenty of opportunity for development. Recently a mining association known as the southeastern industrial association was established. It intended to begin development on a large scale.

Extension of Anshan Mining Zone.—The Chenhsing Mining Co., Anshan, under Sino-Japanese management, applied to the agriculture and commerce office, Peking, for the enlargement of the Anshan mining zone by some 93 square miles in the district adjoining Yingtaoyuan mine. A formal sanction has been recently granted.

Nickel in Yunnan.—In Yunnan nickel ores consisting of galenas, pyrites and kupfer nickel, occurring in the gueiss, slate and quartz rock of sourth-eastern Yunnan have been seen, and sent to London for assay purposes, but no workings of this metal exist in the region.

Certain galenas assayed from the Tungchwan region have been found to contain a small percentage of nickel. Associated with cobalt, the metal seems to exist in ores sent in for examination from the Red River district, to the west of Kochiu, but in none of these regions is any mining going on at the present time.

Japanese coal shipped abroad during 1920 amounted to 3,300,000 tons, including 2,300,000 tons shipped by steamers and 1,000,000 tons loaded as bunker.

Chang Shun Coal Mining Co. to Increase its Capital.—The Chang Shun Coal Mining Co., Huchow, Chekiang, has announced the increase of its capital from $2,200,000 to $3,300,000; the new capital is to be used for the extension of mining areas and purchase of additional machinery.

Operation of Mines Granted.—The ministry of agriculture and commerce has recently authorized the following mining merchants to operate the mineral resources of which they applied for development :—

Mr. Wang Jen-wen to open the coal mine at Lien-Char-shan in Ling-yue, Chihli.

Mr. Chow Chao-pei to open the coal mine at Feng-char-chong in Ping-ding, Shansi.

Iron Ore in Malaya.—An iron mine has been opened in the district of Batu Pahat, Johore, and 5,000 tons of ore are being turned out monthly. The ore is shipped to Japan; but there are signs of coal in the same district, and there are hopes that pig-iron may eventually be produced on the spot.

NEW COMPANIES

New Companies.—The following companies are being organized :—

Pei Li Coal Mining Co., Chihli.
Chen Pao Spinning and Weaving Mill, No. 3, Chihli.
Industrial Bank of Eastern China, Fengtien, by Mr. Wang Kien-jih.
Hung Shun Flour Mill, Tsinan.

New Corporations.—The following corporations have been officially registered with the ministry of agriculture and commerce :—

Pawn Trade Bank, Soochow, Kiangsu.
Yah Shun Steam Launch Navigation Co.
Sin Chen Lard Manufacturing Co., Ltd.

OIL

China's Petroleum Wells.—A recent investigation shows that China possesses petroleum wells in the following provinces :—

Chihli	22
Kirin	2
Yunnan	17
Kiangsu	5
Hunan	4
Szechuan	3
Kwangtung	1
Fengtien	4
Kweichow	13
Shensi	8
Kwangsi	4
Kiangsi	4
Hupeh	2

The total throughout the country is 91 wells, the best of which are in Chihli, Kweichow, Yunnan and Szechuan.—*The Chinese Engineer and Contractor (Chinese).*

Chinese Oil Discovery.—Reports of the discovery of an amazingly rich field of oil, including many gushers, and a quantity of natural gas in Southern China, have been received by the department of commerce. A recent article in the conservative London *Financier*, also forwarded to the department, speaks in glowing terms of the value of the new oil find.

Oil in Sarawak.—Large quantities of oil of good quality are reported to have been discovered in Sarawak, where the Anglo-Saxon Petroleum Company has been prospecting for a considerable time.

A. P. C. Sells Fuel Oil to Japanese Government.—The Asiatic Petroleum Co. (British) has recently completed a contract (through the Rising Sun Petroleum Co.) to furnish the Japanese government with 200,000 tons of fuel oil. When this contract is fulfilled the existing tanks of the Japanese government will be filled to capacity.

PUBLIC WORKS

Canton Planning Committee.—The city of Canton recently formed a planting commission, under the department of public works, for the purpose of studying and preparing a program of municipal improvement. The commission consists of nine members with the commissioner of public work as chairman. The other members are the three divisional chiefs and two other engineers of the public work department. Besides, there are three foreign engineers invited by the mayor to become honorary members of the commission. This commission is chiefly of a technical nature.

RAILWAYS

Light Railway Extension, Kirin.—It is reported that the Tien Doo Light Railway Co., Kirin, operated under Sino-Japanese management, has recently increased its capital and established branches at Lung-tsing-ching and Loh-dao-kew in Yen-ki.

Harbin-Heiho Railway.—It is reported that General Chang Tso-lin favors the construction of a railway from Harbin to Heiho and that General Woo Tsing-sun, tuchun of Heilungkiang, the promoter of the scheme, is appropriating funds to carry out the work.

Electric Locomotives for Japan.—The Westinghouse Electric International Co. has received from the imperial government railways of Japan an order for two electric freight locomotives. These locomotives will weigh 62 tons and have a capacity of 1,000 h.p. each, will operate on the 1,500-volt direct current system.

Shanghai-Hangchow-Ningpo Railway.—The *Sinwanpao* reports :—The Shanghai-Hangchow-Ningpo Railway is asking the British Corporation to allow the railway to have a loan for the repairing of Tsao-Wo-Kiang Railway bridge and the construction of a railway between Shaohsin and Tsaowo, offering the railway income of the line as security.

Extension Work on Peking-Suiyuan Railway.—The Peking-Suiyuan Railway Administration is contemplating the extension of car sheds at Nan-kow, Kong-chong and Ping-dee-chien and the building of lodging quarters at Ping-dee-chien for railway staffs which are estimated at about $167,500 in total. It is stated that the plan has been favorably received by the ministry of communications.

New Structure on Peking-Suiyuan Railway.—It is reported that the Peking-Suiyuan Railway Administration is contemplating the establishment of a signal station at Ning-yuan.

Joint Transportation Conference of Domestic Railway.—The 10th session of the China's railways-joint transportation conference will be

held in the ministry of communications, Peking, at 10 a.m. on Oct. 12, ond a circular letter has been dispatched to the various railways which have joined the conference, notifying them of the date and place. The Kirin-Changchun, Szepingchar-Taonan, Chengting-Taiyuan, Chuchow-Pinghsiang and Canton-Hankow railways are also invited to send delegates to attend the meeting.

The Tokyo Underground Railway Co. Ltd., has decided to increase its capital to Y.80,000,000 from Y.10,000,000. A new route will be built between Shinogawa and Uyeno.

Buy Locomotives, Pay in Goods, are Terms Given to Russia by Baldwin.—The *Advertiser-Ledger* correspondent has learned that the Baldwin Locomotive Works is making overtures to the Soviet government to furnish locomotives to Russia on the basis of payment in commodities which would be carried out of Russia in the locomotives supplied. This would begin on a small scale, the Baldwin company maintaining control of the locomotives until the goods in payment had been delivered. The Baldwin company would act as agent in marketing the Russian goods, and the profits from this arrangement would go into the purchase of more locomotives in constantly increasing quantities, eventually restoring the Russian railway situation to normal.

American Enterprise in the Far East.—According to a telegram received, an American commercial delegation, headed by Dr. Abbot and Colonel Davis, which has been visiting Khabarovsk and the Amur district, has arrived at Chita, where negotiations have been opened with the Far Eastern Republic with regard to a concession concerning the Amur Railway. The delegation, it is stated, found in the course of its investigations that this railway had been completely demolished and that considerable sums would have to be spent on it before it could again be operated. The delegation proposed to form an American company to carry out the necessary repairs on condition that the Chita government granted it a concession with sufficient guarantees. The message points out that Japan is also interested in the Amur Railway. —*Reuter.*

Construction of Sing-ming-Fankao Railway again Mooted.—Some time ago the talk of constructing a railway between Sing-ming and Fankao in Fengtien was taken up by the chambers of commerce of the two districts, but the scheme was dropped owing to lack of funds. According to report from Mukden, the matter has now been revived by the local gentry. The construction cost will be equally subscribed by officials and citizens, and railway materials will probably be supplied by a certain Japanese firm at Mukden.

Railway Under Construction.—Construction work has begun on the Chinchow-Chiaoyang Railway. The line starts at Chinchow on the Peking-Mukden line and extends to Chiaoyang, Inner Mongolia. The decision has been made that the new railway will be made a branch line to the Peking-Mukden line in the expenses for the construction be provided from the income of that railway.

The Paotu-Suaiyuan section of the Peking-Suaiyuan Railway is now being constructed; and it is hoped to complete it by the end of this year.

Construction of the Chunhow-Chuping section of the Canton-Hankow railway was begun on May 1st. The cost will be met by an appropriation which has been set aside from a portion of the revenues of the Peking-Hankow and other railway.

Kaifeng-Tsining Railway.—The construction of a railway from Tsi-ning in Shantung to Kai-feng in Honan which was proposed by several Chinese gentry at Tsi-ning some time ago has been approved by the ministry of communications upon conditions that no foreign money shall be invested nor can it be placed on security for any loan. The line, when completed, will measure about 700 *li* in length and will link up with the branch line Chechow-Tsining railway at its Shantung terminus.

It should be known that Tsining, being favorably located in Shantung province, is fast growing to be a prosperous industrial town and will hold a more important position in business even that Tsinan when opened as a commercial port.

Improvement Work on Peking-Suiyang Railway.—In view of the recent collision of trains which occurred at Fusun station, the Peking-Suiyuan Railway Administration is preparing to take preventive measures against any further similar incident, and has suggested to install electric signals along the whole line of 1,345 *li*, which is estimated at about $2,400,000. But as the government financial condition does not allow such an extensive scheme electric signals will be established only at important stations at a cost of about of $600,000.

RIVERS, HARBORS, WHARVES AND DOCKS

The Imperial Land Colony Co., Ltd. was organized recently with a capital of Y.30,000,000 fully paid up for the purpose of reclaiming 30,000 *chobu* of land at Ariyake Bay in Kyushu.

Pootung to Dig a River.—For the relief of the flood famine at Nan-wei and Chuen-sha, Pootung, it has been suggested that a river be dug in the famine district with the service of famine sufferers. The work will cost about $20,000 which will be probably advanced by the Chinese banks.

Plans of the Chinkiang Customs Commissioner.—The commissioner of customs at Chinkiang has suggested that a road be constructed from King

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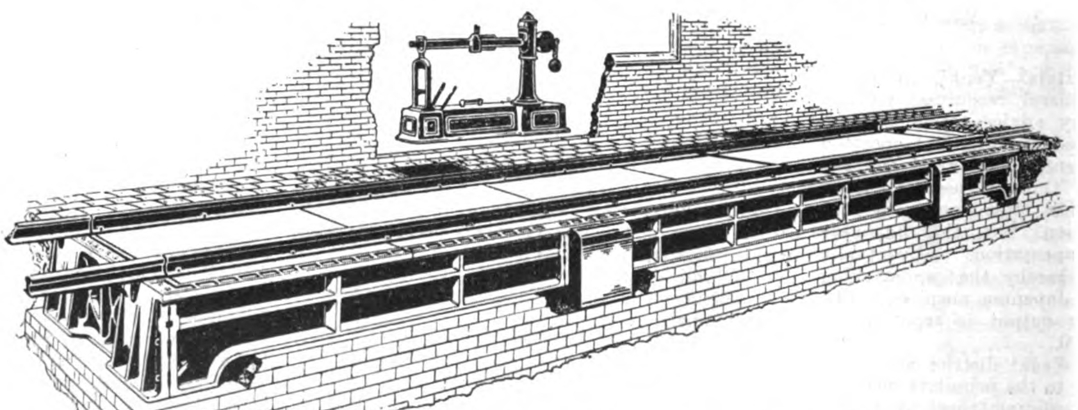

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shan to Kan-lu-tze on the beach recently extended from the Yangtze River and to dredge a stream parallel to the road so as to accommodate an anchorage to the large as well as small vessels. The commissioner is of opinion that if his proposals are adopted the prevailing business depression at Chinkiang will be greatly improved, and regardng the expenditure, he has declared that Messrs. Jardine, Matheson & Co., Chinkiang, will advance a certain amount.

Yangtze Conservancy Commission Proposed.—In view of the deterioration of the Yangtze River especially at the lower reaches which will surely result in a serious flood unless some immediate measures are taken, Mr. Chang Chien and several other conservancy experts such as Mr. Han Tze-shih and Mr. Wang Tan-kwan, under auspices of the Kiangsu civil governor, have proposed to appoint a Yangtze conservancy commission at Nantungchow in the early part of the month to go into the question of improving the river and preventing further deterioration.

Harbor Work Completed Soon: Kobe.—The first unit in the reconstruction of the harbor of Kobe which has been in progress since 1906 at an estimated cost of Y.13,000,000 is to be completed in another few months, reports an *Asahi* special from Kobe.

The features of the proposed reconstruction consist in the reclamation of land covering an area of 85,000 *tsubo* with the object of extending and increasing the number of wharves, the establishment of 18 additional warehouses and railway buildings, construction of special roads, and the increase of the depth of the harbor to 36-ft.

Upon completion of the above work in the near future, the second unit in the plan of reconstruction will be taken up, under which it is proposed to put the finishing touches on the reconstruction work at an estimated cost of Y.20,000,000.

This work will be spread over a period of 12 years.

When this work of reconstruction is all complete, the Kobe Harbor will be the best trading port in Japan.

New Bunding, Nantungchow.—The Flood Prevention Association of Nantungchow has decided to repair the embankment by extending its foundation, increasing its height and joining together the eastern and the western parts which have been separated. Around the embankment there will be spread a layer of stones to impair the violent force of floods.

Reclamation of Shan-men-wan.—The talk of bringing Shan-men-wan, Chekiang, under cultivation by reclamation was taken up about a year ago by some wealthy Chinese overseas with the support of the central government. The matter has been revived by Mr. Ling Yung-ching, a rich Chinese, who recently had an interview with the provincial authorities of Chekiang with regard to the development of the port. As an initiative step, the fishing industry, one of the richest resources of Shan-men-wan, should be placed on a sound footing, and a fishery company capitalized at $2,000,000 is being organized.

Flood Prevention Bureau.—The ministry of communications has recently established a new department to study and devise preventative measures against floods in the railway zones. The new organ is called the railway flood prevention bureau.

Grand Canal Improvements.—In view of the recent flood and famine caused by the overflow of the Grand Canal, the conservancy department of Hsu-kao, Kiangsu, has decided to build a sluice at Chow-yue, Tsan-doo, Chang-wang and Sing-sung, important points on the Canal.

Conservancy Work in Nantungchow.—In view of the terrible flood famine last summer and as a preventive measure against any similar calamity in future, the Nantungchow conservancy department has prepared to repair all the sluices and weirs in Nantungchow. A representative has been sent to ascertain the capacity of the Yung-yen-hu and speed of the water at the sluices.

ROADS

Chefoo-Weihsien Motor Road.—The construction of Chefoo-Weihsien automobile road is going on steadily; at the end of the year transportation service will be possible between Wen-hsien and Lai-chow, and in February, 1922, automobile can reach as far as Wang-hsien. An auto-bus service for the whole line is expected to be inaugurated in April.

Communications with Mongolia.—In a recent telegram to the government, General Chang Tso-ling proposed to build modern roads in Mongolia and suggested that delegates be sent to Jehol, Charhar and Suiyuan to make surveys.

Work of the National Road Construction Association.—With regard to the Kiangsu-Chekiang line as proposed by the National Road Construction Association, General Lu Yung-hsiang, tu-chun of Chekiang, has promised to give it assistance by sending soldiers to carry out the work, while the military governor of Kiangsu, General Chi Sih-yuan, has also supported the plan and will order the military surveying department to make a survey of the line in Kiangsu. General Chi, however, has declared that the government is not responsible for the construction cost of the road.

An Automobile Road Planned.—Mr. Chen Hsu dang, citizen of Gin-hsien, has applied to the local authorities for permission to construct an automobile road from Changshan, Chekiang, to Yu-shan-hsien, Kiangsi, and the proposal is now under the consideration of the authorities concerned.

Estimated Profit on Hangchow-Yuehong Motor Road.—It it estimated that the yearly income from the Hangchow-Yuchong Autobus service, Chekiang, which will be inaugurated soon, will be about $144,000 with a yearly expenditure of $129,980, leaving a gross profit of $14,020.

Pao-Shan District Roads.—While the main line of Pao-shan district from the north to south terminus is nearing completion, the road construction department of the city is preparing to construct another main line running from the east to the west which will start from the west gate and ends at Kwang-foo in its neighboring district Chiar-ting, passing through Tso-chiar Bridge, Yang-hong and Liu-hong and having a length of about of 30 *li*.

A two-mile road will be built between Shimo-otoba and Yono en Nishima province, Kanagawa prefecture.

New Roads in Japan.—A new road will be built between Shimonotoba and Yono, a distance of two miles, in Kanagawa prefecture, Mishima province.

A New Road Under Contemplation.—The road construction department of Nantungchow has decided to construct a motor road at See-kiang in the western district of the city.

Ningpo-Szechee-Chinghai Motor Road, Chekiang.—Messrs. Nue Woo-teh, Chen Pai-hua, Ning Ya-kong and Shun Foo-shan have proposed the construction of a long automobile road passing through the three districts in Chekiang-Ningpo, Szechee and Chinghai, and survey of the line will be made soon. According to the proposed scheme, the main line will start from Li-char-hur-men in Ningpo, passing through Lao-doo-jao, Kuo-doo-tze, Har-poo, King-char-chin, Chu-wang, Ho-lung-shan, Lung-der-chang, Tien-tsai, Wang-sze-kung-shan and Yang-van in Chinghai, then leading to Ming-ngao-chang via Tsong-chee-jao, Zar-ju-dong-jao and Kwai-hai-wai in Szechee, and the branch line will run from Li-char-hur-men in Ningpo to Chinghai.

Narrow Paths to be Improved, Fukien.—Several citizens of Vung-tai, Fukien, who are interested in public work, are beginning the solicitation of a subscription to a certain amount for repairing and extending the narrow paths in the city.

SHIPBUILDING

New Steamer, Shanghai.—The Ping An Dockyard owned by Tung Yue & Co., is now building a steel vessel the *Singpaohua* which will be ready to launch in the coming spring. When completed, she will be placed on the service between Shanghai, Chow-shan, Haimen and Shih-poo.

Diesel Engine for Japan.—The Japanese government recently placed an order with Sulzer Bros. for Diesel engines to the value of £1,250,000, to be installed in the new submarines. The engines are to be 4,000 horse-power, and it is intended to equip each of the vessels with engines aggregating from 16,000 to 20,000 horse-power.

A New Steamer Added to the Fleet of C. M. S. N. Co.—A ocean-going vessel *Sing-hua* having a gross tonnage of 3,500 has been built in Glasgow, England, to the order of China Merchants' Steamship Navigation Co., Shanghai, for their Northern China trade. The new steamer is new detained by the British authorities and on presentation of Chinese government's passport which is now being asked for by the company she will make her first voyage to Shanghai.

A Chinese Built Ship.—The Ping An Engineering and Shipbuilding Works, Ltd., announce the launching of the steamer *Hsin Pao Hua* at their Pootung yards.

A New Blue Flunnel Steamer.—Built to the order of the Ocean Steamship Co., Ltd. (Messrs. Alfred Holt & Co.), of Liverpool, the steel screw passenger and cargo steamer *Meriones* was launched successfully on August 19 from the Hebburn yard of Palmers Shipbuilding and Iron Company, Limited. Of 10,000 tons dw. capacity, the principle dimensions of the *Meriones* are: length, 467-ft. 6-in.; breadth, 58-ft.; depth to upper depth, 35-ft. 3-in. She is of the two-deck type, with poop, bridge and forecastle, and has six holds, one of them insulated for carrying perishable goods. Her derricks have been specially arranged for the rapid handling of cargo. She will be fitted by the building firm with single-screw double-reduction geared Parsons turbines, steam being supplied by two double-ended boilers have Schmidt's superheaters and Howden' forced draught.—*Shipping and Engineering.*

SHIPPING

A Ship Launched: Shanghai.—At the Ping An Engineering and Shipbuilding Works, Ltd., recently, the str. *Hsin Pao Hua* was successfully launched. The new vessel is of the following dimensions:—Length, 189-ft. 6-in.; breadth 30-ft. 8-in.; depth, 18-ft.; speed, nine knots; three cylinders and single screw. When completed she will run between Shanghai, Wenchow, Taichow and Chapoo. The owners of the new vessel are the Toong Yue, Kiang Kee & Co.

Chinese Government Subsidy.—The Chinese government has announced that it will allow subsidy to ships of more than 4,000 tons gross, for

five years according to the rate decided by the minister for communications, on condition that they must be those that have Chinese nationality. It is further stated that an additional subsidy of 5 per cent. will be granted to those ships that have been built in Chinese dockyards. The present announcement has been made with a view to developing the shipbuilding industry and marine transportation in China. It is provided also that, unless three years pass after the suspension of the granting of subsidy no ship can be sold or mortgaged to foreigners.

A New Fire Launch for Shanghai.—A steam fire launch is the latest addition to the craft under the control of the Shanghai harbor master's staff. The launch has a powerful pump of 90 pounds pressure.

New Steamer Service to China.—The Ellerman Bucknall Line on December 2 will inaugurate a passenger service from Liverpool to the Straits, China and Japan.

Chinese Shipping Expansion.—The San Pe Steam Navigation Co., Shanghai, has bought from the Chung Hua Steamship Co. the 770-ton vessel *Washington*, whose name has been changed to *Tze-Kiang*, re-built at a cost of over $10,000. She will be placed on the run from Hankow to Yochow via Changsha.

The Ningpo-Shaoshing Steamship Navigation Co. has announced an increase of its capital of $500.000, which will be used to build a large vessel for the Yangtze service. At present, it has the *Lao Ning-shao*, an old steamer, on the Yangtze, from which a yearly profit of about $100,000 is made.

Steamship Navigation Co. Established by Chinese Overseas.—It is reported that several Chinese overseas including Mr. Li and Mr. Chang have organized a steamship navigation company known as H. H. H. Erlofson with four German vessels purchased from Germany. These steamers named *Wang-kai*, *Chow-fah*, *An-heng* and *Marnila*, have a tonnage of 1,000 each, and the first two have sailed their first voyage from Singapore to Shanghai while the other two will visit Shanghai soon.

A New Steamship Navigation Co. Proposed.—In view of the inadequate means of communication from Shanghai to Wenchow, so far only the steamers' *Hai-yih* and *Kwang-chi* of the China Merchants Steamship Navigation Co. running between these two points, Mr. Chang, magistrate of Wenchow, and Mr. Pai Char chung, division commander at Wenchow, have proposed to establish a new steamship company for Shanghai-Wenchow service. A capital of $600,000 for the enterprise will be raised and wharves will be built at suitable places.

Ferry Service on Whangpoo River Proposed.—Mr. Dong Shih-hung, manager of Pootung Electricity Co., has proposed to organize a steam launch navigation company for ferry service on the Whangpoo river with Chow-chiar-doo, Yang-chin-kong, Shih-loh-pu-jao, Fai-yang-chin-jao, Yangtzepoo Bridge, Nan-ma-do, Tung-chiar-doo, Loh-pai-doo, etc., as stopping places. The company will be capitalized at $100,000 and will inaugurate its service with six steam launches and eight tow-boats. A petition, together with a request for holding a patent for twenty years has been submitted to the ministry of communications for sanction.

N.Y.K. Activities.—News has been received in Shanghai that the Nippon Yusen Kaisha is shortly to have two fast passenger vessels of 5,500 tons gross each which are being built in England placed on its services between Shanghai and Japan ports. The N.Y.K. is already operating seven steamers on its Yokohama-Shanghai line (weekly) and Osaka-Kobe-Shanghai line (twice a week) but has for a long time been planning to inaugurate a fast service between this port and Japan, thereby facilitating connections between China and Japan. Each steamer will carry 360 passengers and have two classes, first and third. They will be able to develop more than 18½ knots an hour, so that the trip between Shanghai and Nagasaki, which now requires 36 hours, can be completed in about 26 hours.

New Steamship Co. Registered.—The Yah Shung Steam Launch Navigation Co., having two vessels *Yah-foong* and *Yah-cheng* to run a service in the interior of China, has been officially registered with the ministry of communications.

TELEPHONES

Telephone Between Shanghai Native City and Foreign Settlement.—It is stated that negotiations are going on between the Shanghai Chinese Telephone Co and the Shanghai Mutual Telephone Co. for a through telephone service between the native city and the settlement, and it is believed that the proposal will be carried out before long.

Shanghai Telephone Expansion.—The municipal council has decided to support the proposal of the Shanghai Mutual Telephone Company to increase its capital from Tls. 1,000,000 to Tls. 2,000,000 and will underwrite on its own behalf the proportion of new shares proposed to be allocated under the scheme.

Chinese Government Want Telegraph Supplies.—The Chinese government telegraph material supply department invites tenders for the supply of various kinds of telegraph materials. Conditions governing tenders, specifications with diagrams, requisition sheets and other particulars, may be obtained from the head office, No. 27 Markham Road, Shanghai, on payment of Mexican dollars ten, which shall not be returnable. All tenders will close on the 21st of December, 1921.

Telephone Extensions, Kiangsu.—It is planned to connect all important cities in the province by long-distance service. Connections between Shanghai and Nanking will probably be completed by the end of 1921. The total cost of the improvements now being effected in the province will amount to approximately $1,000,000 of which $425,000 will be expended in the city of Nanking in a complete reorganization of the local system, including $100,000 for new buildings, $150,000 for interior and $150,000 for exterior equipment. It is understood that the exterior materials are being purchased through the Sino-Japanese Electric Co., and the interior materials from a Chinese-American Company. The service between Nanking and Pukow, located across the Yangtze River, is also being extended. The submarine cable with only two wires, which now connects these two cities, will be replaced by a new cable providing for 26 wires.

TRAMWAY

Harbin Tramways to be Taken up by Americans.—According to report from Harbin, the Chinese authorities will yield the right of laying tramways in Harbin to American capitalists who are now busily engaged in organizing a company ready to carry out the work.

Extension of Tokyo Line.—Tokyo city will extend the street car line from Narihira to Tamanoe, Honjo-ku.

The Nankai Railway Company has received necessary permission to proceed with the construction of a tramline between the west gate of Tenno-ji and Abeno bridge, Osaka.

A New Tramlime, Japan.—The Dai Yusan Tram-car Co., Ltd. has received permission to construct a 5.4 miles line between Odawara and Ashigara, Kanagawa prefecture.

The Ideu Tram-car Company has received government permission to construct a line between Tsinnai and Aushinnai, Oita prefecture, at a cost of Y.275,000.

TRANSPORTATION

Transportation Co., Hankow.—The Railway Transportation Trust Co. of Hankow is being organized with a capital of Tls. 2,000,000 to be divided into 20,000 of Tls. 100 each. Branch offices will be established at important places of China.

WATERWORKS

New Waterworks, Chungking.—Mr. Chen Soo-yung has again proposed the organization of a waterworks company at Chungking which was once taken up some time ago and dropped owing to lack of funds. Pumping machines have been ordered from Shanghai.

Chefoo Waterworks.—According to report from Chefoo, Mr. Stephen (translated according to pronunciation of Chinese characters), an American engineer, has applied to the Chinese officials and chamber of commerce of the port, for a concession to establish the Chefoo Waterworks Co., proposed for some time, at a cost of $200,000 to be repaid to him by the chamber of commerce in installments within twenty years.

Artesian Wells, Ningpo.—In view of the recent great fire in Ningpo, the merchants' union has decided to bore two wells at Tung-dien-mye and Nee-ching-mye respectively.

WIRELESS

Wireless for Kashgar.—A party of engineers are being sent from Peking to install a wireless station at Kashgar, establishing communication with Ulumutsi and Peking.

Well-Water Supplying Co. Established, Sungkiang.—The Kan Chien Well-water Supplying Co. has been established in Sungkiang by Mr. Hsu Hsih-tze, a local gentry, with a capital of $10,000. Many deep wells have to be bored by new methods from which pure water is obtained, and Mr. Wu Hsuan-foong, an expert in this particular work, has been employed.

Sino-American Wireless Contract.—With regard to the Sino-American wireless contract, the Federated Wireless Telegraphy Company has planned to establish six wireless stations at Shanghai, each having a height of 1,006 feet and one at Peking, Canton and Harbin respectively each with a height of 626 feet. It is reported that the American engineer has arrived in China and that the construction work is to be finished within eighteen months.

A British Loan Reported.—It is reported that the Peking government has signed a contract with Marconi Telegraph Co. for a loan amounting to £200,000 sterling for establishment of wireless stations at Lasai in Tibet, Lanchow in Kansu and Partung and Chungking in Szechuan. The terms of the loan are reported to be exactly the same as last wireless loan concluded in 1918.

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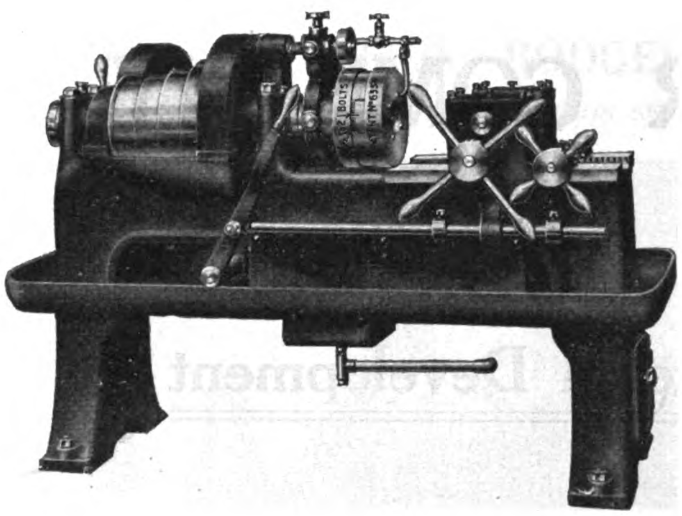

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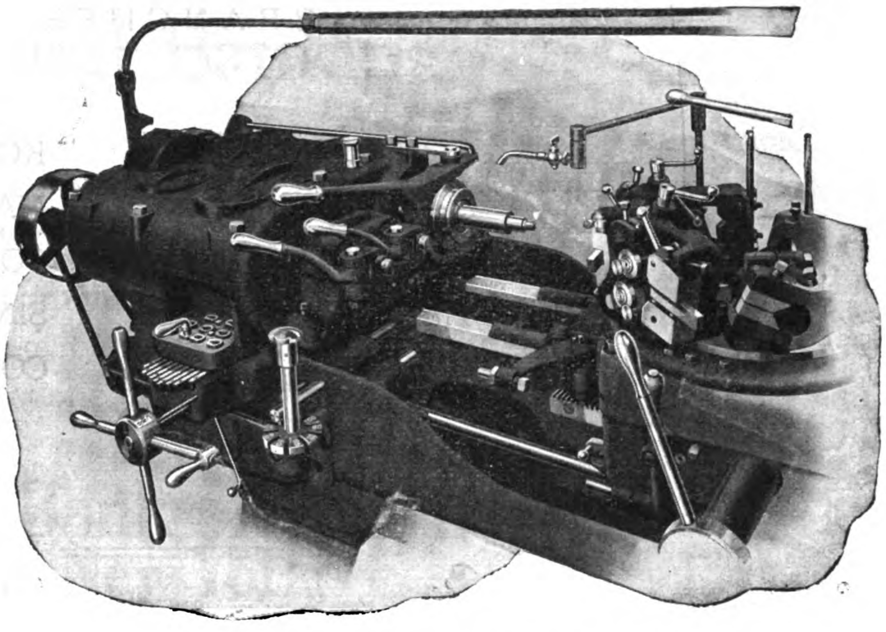

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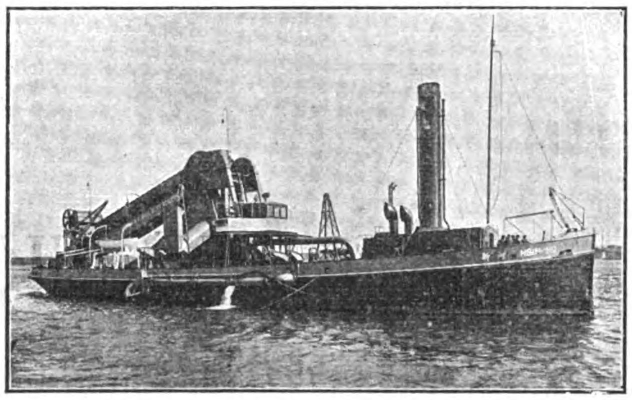

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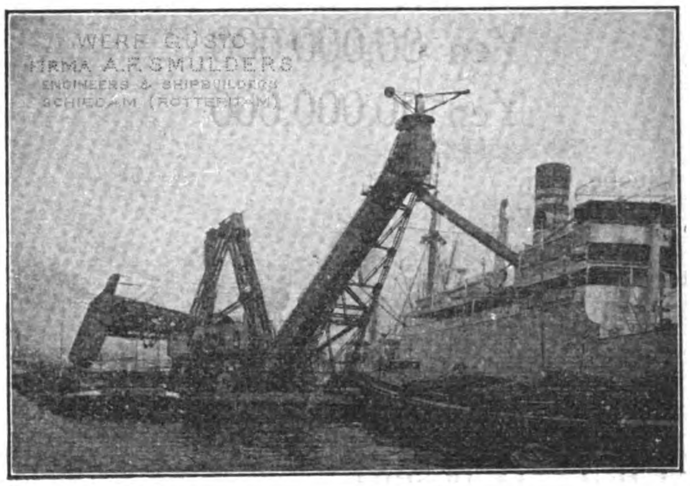

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(All communications relating to correspondence arrangements and the Bank's general foreign business to be addressed to the Foreign Department)

Branches:

Japan Proper—Tokyo, Osaka, Kobe, Shimonoseki
Korea—Chemulpo, Pyengyang, Fusan, Wonsan, Taiku, Chinnampo, Kunsan, Mokpo, Hoilyong, Chongjin
Manchuria—Antung, Fengtien (Mukden), Dairen, Yingkow (Newchwang), Changchun, Harbin, Tiehling, Liaoyang, Ryojun, Kaiyuan, Chengchiatun, Szupingchieh, Fuchiatien, Kirin, Lungchingtsun
China Proper—Shanghai, Tientsin, Tsingtao, Tsinan
Siberia—Vladivostock, Alexandrofsky Post

NEW YORK AGENCY :

The City Investing Building, 165 Broadway, New York City

LONDON REPRESENTATIVE :

Gresham House, 24 Old Broad Street, London, E. C. 2

Correspondents:

San Francisco, Seattle, New York, London, Paris and in other commercial centers throughout the world

International Banking Corporation

CAPITAL, SURPLUS AND UNDIVIDED PROFITS: G. $14,000,000

OWNED BY THE NATIONAL CITY BANK OF NEW YORK

HEAD OFFICE: 60 WALL STREET, NEW YORK

LONDON OFFICE: 36 BISHOPSGATE, E.C.

LYONS OFFICE: 27 PLACE TOLOZAN

SAN FRANCISCO OFFICE: 232 MONTGOMERY STREET

BRANCHES:

CHINA
- CANTON
- HANKOW
- HARBIN
- HONGKONG
- PEKING
- SHANGHAI
- TIENTSIN

DOMINICAN REPUBLIC
- BARAHONA
- PUERTO PLATA
- SAN FRANCISCO DE MACORIS
- SAN PEDRO DE MACORIS
- SANCHEZ
- SANTIAGO
- SANTO DOMINGO

INDIA
- BOMBAY
- CALCUTTA
- RANGOON

JAPAN
- KOBE
- YOKOHAMA

JAVA
- BATAVIA
- SOURABAYA

PANAMA
- COLON
- PANAMA

PHILIPPINE ISLANDS
- CEBU
- MANILA

SPAIN
- MADRID
- BARCELONA

STRAITS SETTLEMENTS
- SINGAPORE

BRANCHES OF THE NATIONAL CITY BANK OF NEW YORK

ARGENTINA
- BUENOS AIRES
- ROSARIO

BELGIUM
- ANTWERP
- BRUSSELS

BRAZIL
- PERNAMBUCO
- PORTO ALEGRE
- RIO DE JANEIRO
- SANTOS
- SAO PAULO

CHILE
- SANTIAGO
- VALPARAISO

COLOMBIA
- BARRANQUILLA
- BOGOTA
- MEDELLIN

CUBA
- HAVANA AND 22 BRANCHES

ITALY
- GENOA

PERU
- LIMA

PORTO RICO
- PONCE
- SAN JUAN

SOUTH AFRICA
- CAPE TOWN

URUGUAY
- MONTEVIDEO

VENEZUELA
- CARACAS

Commercial and Travellers' Letters of Credit, Bills of Exchange and Cable Transfers bought and sold. Current accounts opened and Fixed Deposits in local and foreign currencies taken at rates that may be ascertained on application to the Bank.

N. S. MARSHALL, *Manager.*

1A KIUKIANG ROAD.

BANQUE DE L'INDO-CHINE.

Capital ... ... **Frs. 72,000,000**
Reserves ... ... **„ 70,000,000**

HEAD OFFICE: 15 BIS RUE LAFFITTE, PARIS.

Succursales et Agencies:

Bangkok	Haiphong	Mongtze	Pnom-Penh	Singapore
Battambang	Hankéou	Nouméa	Pondichery	Tientsin
Canton	Hanoi	Papeete	Saigon	Tourane
Djibouti	Hongkong	Peking	Shanghai	

Bankers:

IN FRANCE: Comptoir National d'Escompte de Paris, Credit Lyonnais; Banque de Paris et des Pays-Bas; Crédit Industriel et Commercial Société Générale.

IN LONDON: The National Provincial and Union Bank of England, Ltd.; Comptoir National d'Escompte de Paris; Crédit Lyonnais.

The Shanghai Agency undertakes all banking operations and exchange business; grants credits on goods and approved securities and receives deposits on current and fixed deposits according to arrangement.

L. ARDAIN, *Manager.*

The First National Bank of Boston

Transacts commercial banking business of every nature

Correspondence Solicited

Capital, Surplus and Profits
$37,500,000

SOUTH AMERICA

HEAD OFFICE: MONTREAL, CANADA

We offer a complete banking service in the following countries, special attention being given to the handling of collections.

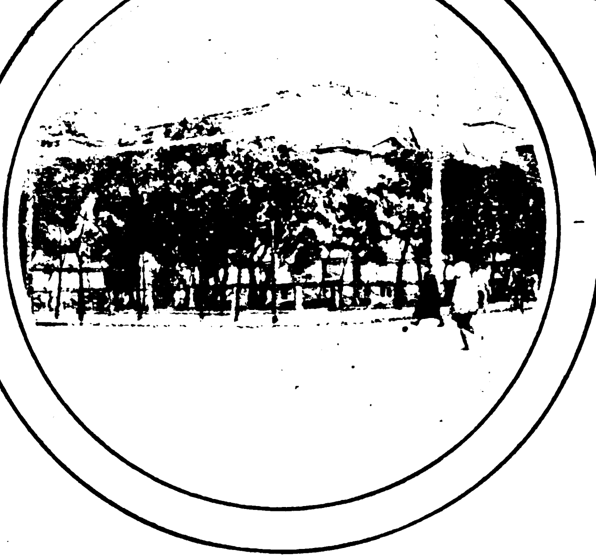
ARGENTINE Buenos Aires.
BRAZIL Rio de Janeiro, Santos, Sao Paulo.
URUGUAY Montevideo.
VENEZUELA Caracas, Ciudad Bolivar. Maracaibo.
COLOMBIA Barranquilla.
BR. GUIANA Georgetown, Rose Hall, New Amsterdam.

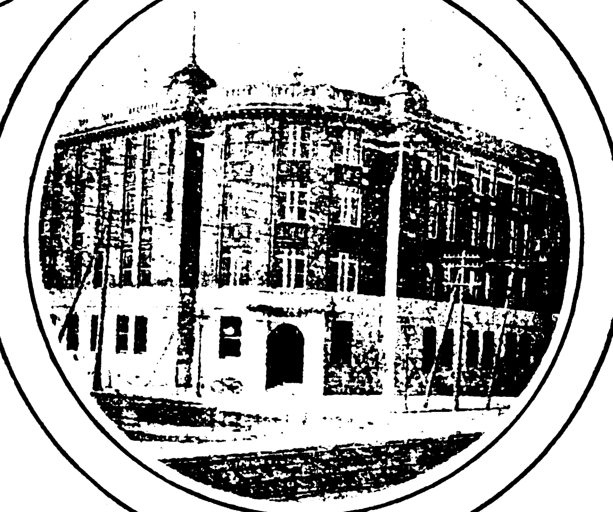
Also 90 Branches in
CUBA, PORTO RICO, DOMINICAN REPUBLIC, HAITI, COSTA RICA, BR. HONDURAS, BRITISH WEST INDIES and FRENCH WEST INDIES
624 Branches throughout CANADA & NEWFOUNDLAND

LONDON Princes St., E.C.
PARIS 28, Rue du Quatre-Septembre.
NEW YORK 68, William St.
BARCELONA Plaza de Cataluna 6.

THE ROYAL BANK OF CANADA

CAPITAL PAID UP & RESERVES $40,000,000
TOTAL RESOURCES - - $550,000,000





THE BANK OF TAIWAN LTD.

INCORPORATED BY SPECIAL IMPERIAL CHARTER, 1899

Capital Subscribed - - - - - - -	Yen 60,000,000
Capital Paid-up - - - - - - -	„ 45,000,000
Reserve Funds - - - - - - -	„ 9,680,000

President: KOJURO NAKAGAWA, Esq. Vice-President: SHUNROKURO MORI, Esq.

DIRECTORS:

TSUNEKICHI IKEDA, Esq.
GUNJI KAWASAKI, Esq.
TADASU HISAMUNE, Esq.
KUMEMATSU MORINAGA, Esq.
MASUMI ESAKI, Esq.

***Head Office:* TAIPEH, FORMOSA (TAIWAN)**

BRANCHES:

JAPAN: Tokio (General Affairs Department), Kobe, Moji, Osaka, Yokohama.
TAIWAN: Keelung, Tainan, Takow, and 11 other points.
CHINA: Amoy, Canton, Foochow, Hankow, Kiukiang, Shanghai, Swatow.
OTHERS: Bangkok, Batavia, Bombay, Hongkong, London, New York, Semarang, Singapore, Soerabaya.

AGENTS AND CORRESPONDENTS:

In the Principal Cities and Towns throughout the World.

LONDON BANKERS:

BARCLAYS BANK, LTD. LLOYD'S BANK, LTD. LONDON COUNTY WESTMINSTER & PARR'S BANK, LTD.

TOKYO BRANCH:

No. 1, Eiraku-cho Ni-chome, Kojimachi-ku.

Telegraphic Address: "TAIWANGINK."

Phone Nos. 1060, 1061, 1062, 1063, 1064, 1065, 1066, 446, 447, 448 and 449, Marunouchi.

Interest allowed on Fixed Deposits, and Current Accounts on terms which may be ascertained on application. Most favourable terms are granted for Petty Current Accounts.

Every description of Exchange and General Banking business transacted.

Special facilities are available for exchange business on China, Straits Settlements, East Indies, Australia, Great Britain, Russia, America, Canada, South Africa, etc.

Industrial Bank of Japan, Limited

(NIPPON KOGYO GINKO)

Incorporated by Special Charter in 1902 to Encourage Foreign Investments

CAPITAL SUBSCRIBED - - - - - -	Yen 50,000,000
CAPITAL PAID-UP - - - - - - -	Yen 45,000,000

HEAD OFFICE:
MARUNOUCHI, TOKYO. CABLES "KOGIN," TOKYO

BRANCHES:
TOKYO: NIHONBASHI
OSAKA: KORAIBASHI
KOBE: NAKAMACHI

H. HIJIKATA, Esq., President — Y. ONO, Esq., Vice-President
K. IYANAGA, Esq., Director — T. IWASA, Esq., Director
KOZO MATSUMOTO, Esq.

AUDITORS:
NAGATANE SOMA, Esq. — KINTARO HATTORI, Esq.
KINICHI KAWAKAMI, Esq. — TAICHI OHBA, Esq.

All descriptions of general banking, exchange, both foreign and domestic, and trust and corporation financial business transacted.

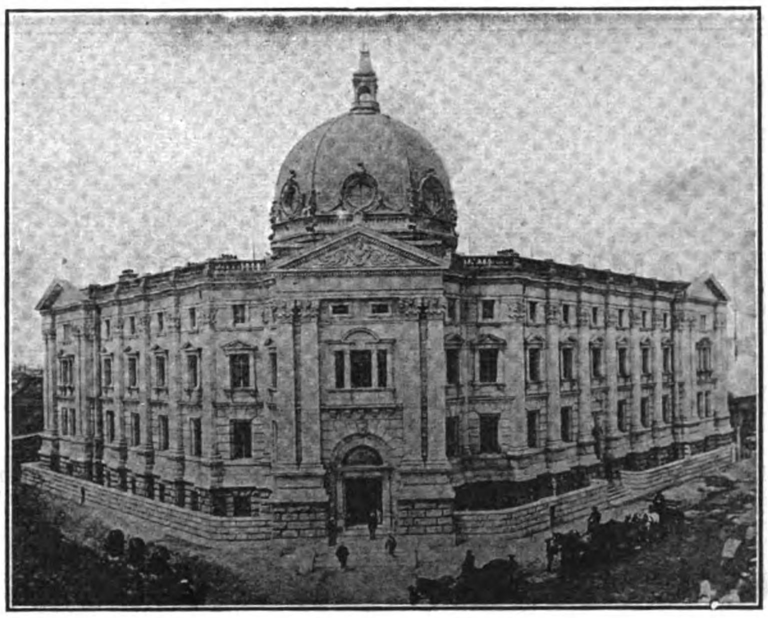
Correspondents in the principal cities at home, and in London, Paris, New York, and San Francisco.

BUSINESS TRANSACTED:

1.—Loans on the security of public bonds of debentures and shares, estates (Zaidan), specified land and buildings.
2.—Subscription and underwriting public bonds or debentures.
3.—Deposits and safe custody of valuables.
4.—Trust company business.
5.—Discounting of bills.
6.—Foreign exchange business.
7.—Other banking business sanctioned by the Minister of State for Finance in accordance with Law of Ordinance.

Capital (Fully Paid-Up): Yen 100,000,000

Reserve Fund: Yen 57,000,000



HEAD OFFICE, YOKOHAMA

CORRESPONDENTS AT ALL THE CHIEF COMMERCIAL CITIES IN THE WORLD

The Yokohama Specie Bank, Ltd.

Established 1880

DIRECTORS:

President: NAKAJI KAJIWARA, Esq.
Vice-President: SHIMAKICHI K. SUZUKI, Esq.
NAGATANE SOMA, Esq.
YUKI YAMAKAWA, Esq.
MASNOSKE ODAGIRI, Esq.
BARON KOYATA IWASAKI
KONOJO TATSUMI, Esq.
FUKUSABURO WATANABE, Esq.
IWAO MATSUKATA, Esq.
BARON KAISAKU MORIMURA
REITARO ICHINOMIYA, Esq.
KENJI KODAMA, Esq.
KIMPEI TAKEUCHI, Esq.
TARO HODSUMI, Esq.

Head Office: YOKOHAMA
Manager: H. MORI, Esq.

TOKYO BRANCH
No. 1, Itchome, Eirakucho, Kojimachi-ku.
Manager: K. MOGAMI, Esq.

BRANCHES AND AGENCIES.

Batavia	Dairen	Hongkong	Los Angeles (*sub-office of San Francisco Branch*)	Nagoya	Rangoon	Shanghai	Tientsin
Bombay	Fengtien	Honolulu	Lyons	Newchwang	Rio de Janeiro	Shimonoseki	Tsingtau
Buenos Aires	Hamburg	Kaiyuang	Manila	New York	Saigon	Singapore	Tsinan
Calcutta	Hankow	Kobe	Nagasaki	Osaka	San Francisco	Sydney	Vladivostock
Changchun	Harbin	London		Peking	Seattle	Sourabaya	

LONDON BANKERS

LLOYD'S BANK, LIMITED
LONDON COUNTY WESTMINSTER AND PARR'S BANK, LIMITED
NATIONAL PROVINCIAL AND UNION BANK OF ENGLAND, LIMITED
LONDON JOINT CITY AND MIDLAND BANK, LIMITED

**Interest allowed on Current Accounts and Fixed Deposits on terms to be ascertained on application.
Every description of Banking business transacted.
For particulars, apply to the managers.**

THE SUMITOMO GOSHI-KAISHA

OSAKA, JAPAN

OWNERS OF BESSHI COPPER MINE, COAL MINES, SILVER AND GOLD MINES, ETC.

MANUFACTURERS OF

Tubes, Plates, Sheets and Bars of Copper, Brass, Bronze and other Alloys, Solid and Drawn Steel Tubes, Nails, Etc.—Superphosphate and Composite, Manure, Sulphuric and Nitric Acid, etc.

GENERAL WAREHOUSE AND BANKING BUSINESS

WORKS AND DEPARTMENTS

Warehouses	Osaka, Kobe & Tokyo
Mining Offices	Besshi, Wakamatsu, Sapporo & Ohgayu
WORKS:	
Copper Works	Osaka & Amagasaki
Fertilizer Works	Niihama
Sales Departments	Osaka, Kobe, Tokyo, Kure, Yokosuka, Hakata, Shanghai, Hankow and Tientsin

THE SUMITOMO STEEL WORKS, LTD.

OSAKA, JAPAN

President: Baron K. SUMITOMO

MANUFACTURERS OF

Steel Ingots, Steel Forgings, Steel and Iron Castings of Every Description for Railways, Shipbuilding Yards, Mines, Hydraulic Electric and Other Engineering Works, etc., etc.

THE SUMITOMO ELECTRIC & CABLE WORKS, LIMITED

OSAKA, JAPAN

President: Baron K. SUMITOMO

MANUFACTURERS OF

Copper, Brass, Bronze and Nickel Wires and Strips, Trolley Wires, Insulated Wires and Cables of Every Description for Telephone, Telegraph, Lighting, Power Transmission, etc., etc.

THE SUMITOMO BANK, LIMITED

Head Office: OSAKA, JAPAN

Cable Address: "SUMITBANK"

President: Baron K. SUMITOMO

Established March, 1912

(Successors to The SUMITOMO BANK)

Capital Subscribed	Yen 70,000,000	Reserve Fund	Yen 20,200,000
Capital Paid-up	„ 40,000,000	Deposits	„ 38,100,000

(as on 20th July, 1921)

Head Office: Kitahama, Osaka

City Offices: Semba, Bingomachi, Nakanoshima, Dotonbori, Kawaguchi, Tenma, Nipponbashi.

Home Branches: Tokyo (Tokyo, Toriaburacho, Fukagawa, Shinbashi, Asakusa), Yokohama, Nagoya, Kyoto (Kyoto and Nishijin), Kobe (Kobe and Hyogo), Onomichi, Niihama, Kure, Hiroshima, Yanai, Shimonoseki, Moji, Wakamatsu, Kokura, Hakata and Kurume.

Foreign Branches: Shanghai, Hankow, Bombay, London, New York and San Francisco.

Agents: The Sumitomo Bank of Hawaii, Ltd., Honolulu, Lloyds Bank, Ltd., London, National City Bank of New York, New York.

Correspondents: In all important places at home and abroad.

The Bank buys, sells and receive for collection Drafts and Telegraphic Transfers, issues Commercial and Travellers Letters of Credit available in all important parts of the world, besides doing general Banking business.

THE

MITSUBISHI BANK, LIMITED

CAPITAL SUBSCRIBED - Yen 50,000,000
CAPITAL PAID-UP - - - Yen 30,000,000

PRESIDENT:

Baron Koyata Iwasaki

MANAGING DIRECTORS:

Mr. Manzo Kushida — Mr. Mikitaro Kikuchi
Mr. Kiyoshi Sejimo — Mr. Takeo Kato

HEAD OFFICE:

No. 1 Yayesucho Itchome, Kojimachi-ku, Tokyo, Japan.

BRANCH OFFICES:

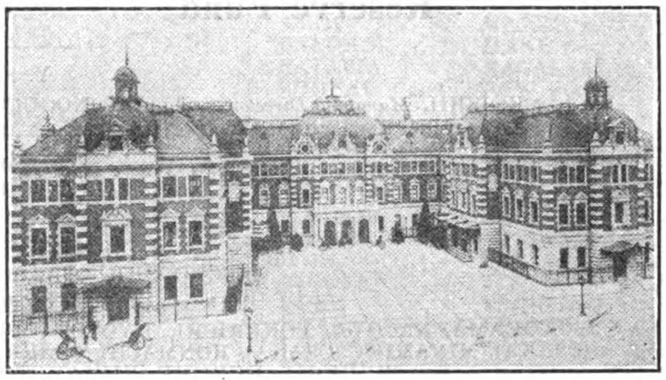
Fukagawa (Tokyo), Marunouchi (Tokyo), Nihombashi (Tokyo), Osaka, Nakanoshima (Osaka), Kobe, Kyoto, Nagoya, Shanghai, New York and London.

General Banking and Exchange Business

Agents for Hongkong and Shanghai Banking Corporation

THE MITSUI BANK, LTD.

The Oldest Bank in Japan, Founded in 1673



Capital Subscribed.............................Y. 100,000,000.00
Capital Paid-Up.....................Y. 60,000,000.00
Reserve Fund (July 1921)......Y. 28,000,000.00

HEAD OFFICE:

No. 1 Suruga-cho, Nihonbashi-ku, TOKYO

***BOARD OF DIRECTORS*:**

GENYEMON MITSUI, Esq. (*President*); SEIHIN IKEDA, Esq., UMEKICHI YONEYAMA, Esq., NAOJIRO KIKUMOTO, Esq. and OTOHIKO MAJIMA, Esq. (*Managing Directors.*)
TOMITARO HARA, Esq., KANETARO KISHIMOTO, Esq., HIROKICHI KAMESHIMA, Esq. and KIKUSABURO FUKUI, Esq. (*Directors*).

Branches:

NIHONBASHI (Tokyo), OTARU, YOKOHAMA, NAGOYA, KYOTO, OSAKA, NISHI (Osaka), KAWAGUCHI (Osaka), NAKANOSHIMA (Osaka), KOBE, HIROSHIMA, SHIMONOSEKI, MOJI, WAKAMATSU, FUKUOKA, NAGASAKI, SHANGHAI.

Foreign Agents:

London: Barclays Bank, Ltd.
London Joint City & Midland Bank, Ltd.
New York: The National City Bank of New York.
The Chase National Bank.
Bankers Trust Co.
Paris: Banque de l'Union Parisienne.
Comptoir National d'Escompte de Paris.
Bombay: National Bank of India, Ltd.

THE DAI-ICHI GINKO, LTD.

(FORMERLY THE FIRST NATIONAL BANK)

ESTABLISHED 1873

Subscribed Capital	- - -	Yen 50,000,000.00
Paid-Up Capital	- - - -	Yen 29,525,000.00
Reserve Fund	- - - -	Yen 29,500,000.00

Y. SASAKI, *President*

K. ISHII, *Managing Director.* Y. NOGUCHI, *Managing Director.* S. SUGITA, *Managing Director.*

HEAD OFFICE:
No. 1 KABUTO-CHO, NIHONBASHI-KU, TOKYO.
T. AKASHI, *Manager*

CITY BRANCHES:
ISECHO, SHIN-OSAKACHO, FUKAGAWA, MARUNOUCHI.

HOME BRANCHES:
YOKOHAMA, NAGOYA, YOKKAICHI, KYOTO, NISHIJIN (KYOTO), GOJO (KYOTO), FUSHIMI, OSAKA, NISHIKU (OSAKA), MINAMIKU (OSAKA), HONMACHI (OSAKA), KOBE, HYOGO, HIROSHIMA, SHIMONOSEKI, CHOFU, MOJI, FUKUOKA, KURUME, KUMAMOTO, HAKODATE, OTARU, SAPPORO, MURORAN.

BRANCHES IN COREA:
SEOUL, FUSAN.

LONDON & NEW YORK BANKERS:

London: London County Westminster & Parr's Bank, Ltd.; The London Joint City & Midland Bank, Ltd.; The Yokohama Specie Bank, Ltd.

New York: The National City Bank of New York.; The National Bank of Commerce in New York.; The Yokohama Specie Bank, Ltd.

CORRESPONDENTS:
The Bank, in addition to its own Branches, has numerous Agencies or Correspondents in the principal Cities and Towns at Home and Abroad.

THE EAST ASIA INDUSTRIAL

COMPANY, LIMITED

(TOA KOGYO KABUSHIKI KAISHA)

TOKYO

ESTABLISHED 1909

FINANCIERS AND CONTRACTORS

K. ARAI, Esq., *President*

R. SHIRAIWA, Esq., *Managing Director*

Subscribed Capital	. . . . . .	Yen 20,000,000
Paid-up Capital	. . . . . .	„ 11,500,000

Branches: SHANGHAI, PEKING, HANKOW.

Hongkong and Shanghai Banking Corporation

Paid-up Capital	...	$15,000,000
Reserve Funds: Sterling	...	£2,500,000
Silver	...	$21,500,000
Reserve Liability of Proprietors	...	$15,500,000

Court of Directors:

G. T. M. EDKINS, Esq. Chairman
G. M. DODWELL, Esq. Deputy Chairman
D. G. M. BERNARD, Esq.
A. S. GUBBAY, Esq.
Hon. Mr. P. H. HOLYOAK
A. O. LANG, Esq.
Hon. Mr. E. V. D. PARR
W. L. PATTENDEN, Esq.
J. A. PLUMMER, Esq.
H. P. WHITE, Esq.

Head Office:
HONGKONG

Chief Manager:
HONGKONG . . . Hon. Mr. A. G. STEPHEN

London Bankers:
LONDON COUNTY WESTMINSTER AND PARR'S BANK LTD.

Shanghai Branch: 12 The Bund
Sub-Agency: 9 Broadway

Branches and Agencies:

AMOY	MALACCA
BANGKOK	MANILA
BATAVIA	NAGASAKI
BOMBAY	NEW YORK
CALCUTTA	PEKING
CANTON	PENANG
COLOMBO	RANGOON
FOOCHOW	SAIGON
HANKOW	S. FRANCISCO
HARBIN	SHANGHAI
ILOILO	SINGAPORE
IPOH	SOURABAYA
JOHORE	TIENTSIN
KOBE	TSINGTAO
KUALA LUMPUR	VLADIVOSTOCK
LONDON	YOKOHAMA
LYONS	

Interest allowed on Current Accounts and on Fixed Deposits according to arrangement.

Local Bills Discounted. Credits granted on approved Securities and every description of Banking and Exchange business transacted. Drafts granted on London and the chief commercial places in Europe, India, Australia, Africa, China, Japan and America.

G. H. STITT, *Manager.*

THE JUGO GINKO, Ltd.

(THE FIFTEENTH BANK)

TOKYO, JAPAN

Telegrams: "Jugoginko, Tokio"

Capital Subscribed Y. 100,000,000 Capital Paid-Up Y. 49,750,000 Reserve Funds Y. 17,478,600

President:
HON. IWAO MATSUKATA

Vice-President:
MASAYASU NARUSE, Esq.

Managing-Directors:
YUTSUHA SATO, Esq.
KANESATO AIKO, Esq.

Directors:
BARON KOKICHI SONODA
MARQUIS YORIMICHI TOKUGAWA
VISCOUNT YUKIYOSHI AOYAMA
HON. NAGAYUKI ASANO
YOSHITERU SHIMIZU, Esq.
MASAO MATSUKATA, Esq.
KIYOSUMI TANIKAWA, Esq.

Auditors:
MASAKAZU HISANO, Esq.
BARON MICHITOMO IWAKURA
NAOYOSHI YAMAMOTO, Esq.
TAKAJI SEKIGUCHI, Esq.
TAKAYUKI IMAI, Esq.

Head Office Manager: **Kiyosumu Tanikawa, Esq.**

LONDON BANKS AND AGENTS:

LAZARD BROTHERS & CO., LTD.
UNION DISCOUNT CO. OF LONDON, LTD.
LONDON COUNTY WESTMINSTER AND PARR'S BANK, LTD.

BANK OF COMMUNICATIONS

(Specially authorised by Presidential Mandates of April 7th, 1914 and October 31st, 1915 making the Bank of Communications a National Bank).

Head Office: Peking

CAPITAL . . Kuping Tls. 10,000,000

President: TSAO JOU LIN

Vice-President: JEN FUNG PAO

Every description of Banking and Exchange business transacted.
Interest allowed on Current Accounts and Fixed Deposits according to arrangement.
Credits granted on approved Securities.
Special Facilities for Transfers to all parts of China.

Branches

CHIHLI PROVINCE.—Peking, Tientsin, Tungchow, Paotingfu, Haitien, Tangshan, Shuntefu, Shengfang.

SHANTUNG PROVINCE.—Tsinanfu, Tsininchow, Chefoo, Techow, Tsaochwang, Lungkow.

HONAN PROVINCE.—Kaifeng, Lohyang, Chengchow, Chiaotso, Chowchiakow, Taokow, Leiho, Hsinhsiang, Changtefu, Hsinyangchow.

SHANSI PROVINCE.—Shihchiachwang, Tatungfu, Fengcheng, Yangkao.

KIANGSU PROVINCE.—Shanghai, Soochow, Wusieh, Chinkiang, Yangchow, Tsing-kiangpu, Pukow, Penpu, Hsuchow.

CHEKIANG PROVINCE.—Hangchow, Ningpo.

HUPEH PROVINCE.—Hankow, Shasi, Ichang.

KIANGSI PROVINCE.—Kiukiang.

HUNAN PROVINCE.—Changsha, Changteh, Yochow, Hengchow, Hsiangtan

SZECHUAN PROVINCE.—Chungking.

ANHWEI PROVINCE.—Wuhu, Anking, Hsuancheng, Panpu

KWANGTUNG PROVINCE.—Canton.

THREE EASTERN PROVINCES.—Yinkow, Fengtien, Changchun, Kirin, Tiehling, Sunchiatai, Liaoyang, Harbin, Chinhsien.

SPECIAL DISTRICTS.—Jehol, Kueihuacheng, Lenghsien, Chihfeng, Hsinsi, Kalgan (Chahar).

ABROAD.—Hongkong, Singapore.

Steel Plate and Structural Work for Municipalities, Industries and Institutions.

ELEVATED TANKS	PULP DIGESTERS
STORAGE TANKS	CHEMICAL TANKS
SPECIAL TANKS	OIL REFINERY EQUIPMENT
TOWERS	CAISSONS
CHIMNEYS	HEAVY STEEL PLATE WORK
OIL TANKS	MISCELLANEOUS STRUCTURAL WORK

Responsible representatives are requested to write or cable for our agency proposition.

Catalogue No. 60 Sent on Request

CHICAGO BRIDGE & IRON WORKS,

3115 Hudson Terminal Building, New York.
2116 Old Colony Bldg., Chicago.
1006 Rialto Bldg., San Francisco.

We accept facts.

Face them dispassionately.

Fairly comment upon them.

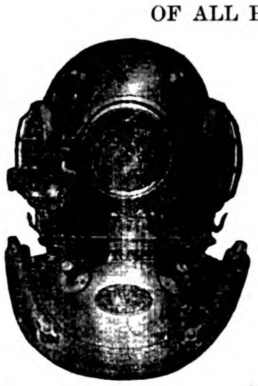
Why ?

They affect trade !

FAR EASTERN REVIEW

DIVING APPARATUS

OF ALL PATTERNS IN USE TO-DAY



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BRITISH ADMIRALTY,
WAR OFFICE,
INDIA OFFICE,
TRINITY HOUSE, etc.

Prompt shipment of complete sets and accessories of every description

Immediate Delivery

ALSO MAKERS OF

SMOKE HELMETS for Steamships, Oil Tankers, Oil Companies, Chemical Works, etc.
OXYGEN BREATHING APPARATUS For Rescue Work in Mines
MEDICAL OXYGEN APPARATUS for Resuscitation purposes
Oxygen Supplies of every description
Air Compressors Vacuum Pumps

SIEBE, GORMAN & CO., LTD.
187 WESTMINSTER BRIDGE ROAD,
LONDON, ENGLAND

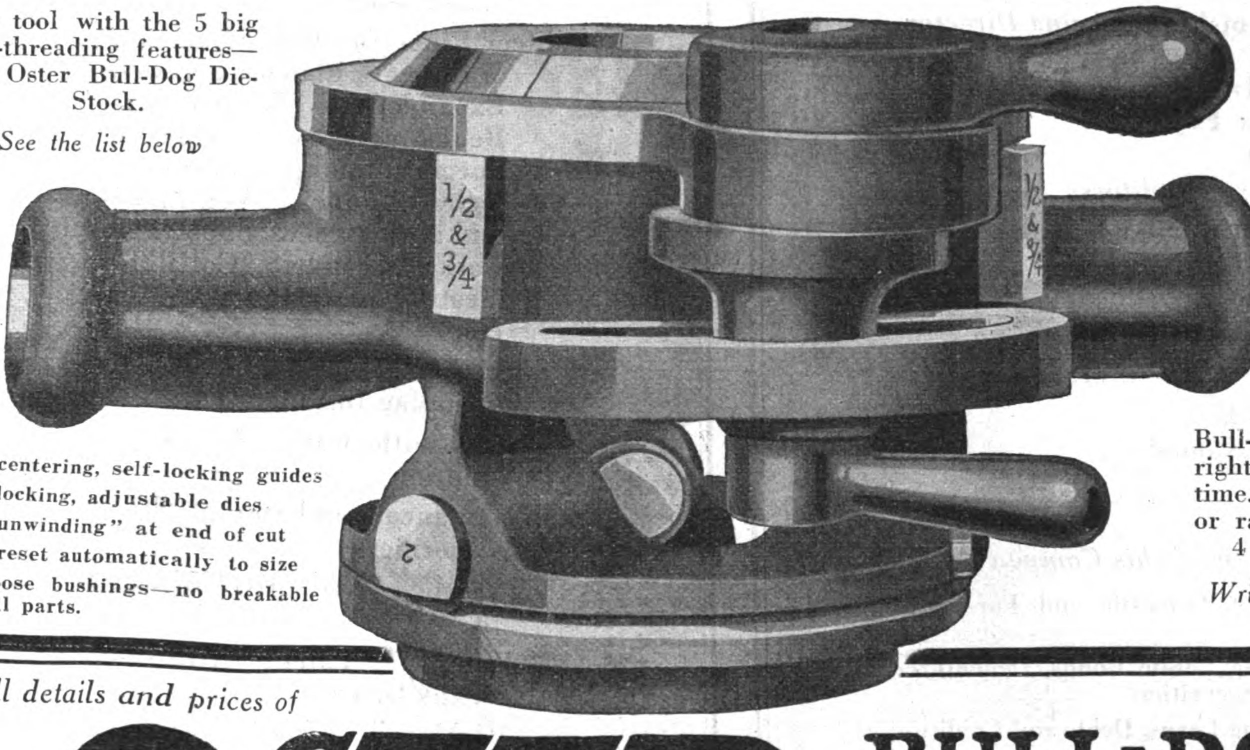
Agents for Japan and South China: MITSUI BUSSAN KAISHA

Cables: "SIEBE, LONDON."

Codes used: A.1, A.B.C. (5th Edition), Western Union, Engineering & Private

The tool with the 5 big easy-threading features—The Oster Bull-Dog Die-Stock.

See the list below



No. 102 shown here threads all sizes from ¼-in. to 1¼-in.

1. Self-centering, self-locking guides
2. Self-locking, adjustable dies
3. No "unwinding" at end of cut
4. Dies reset automatically to size
5. No loose bushings—no breakable small parts.

Bull-Dog Die-Stocks make right, tight joints the first time. Eleven tools – plain or ratchet. Each threads 4 to 8 sizes of pipe.

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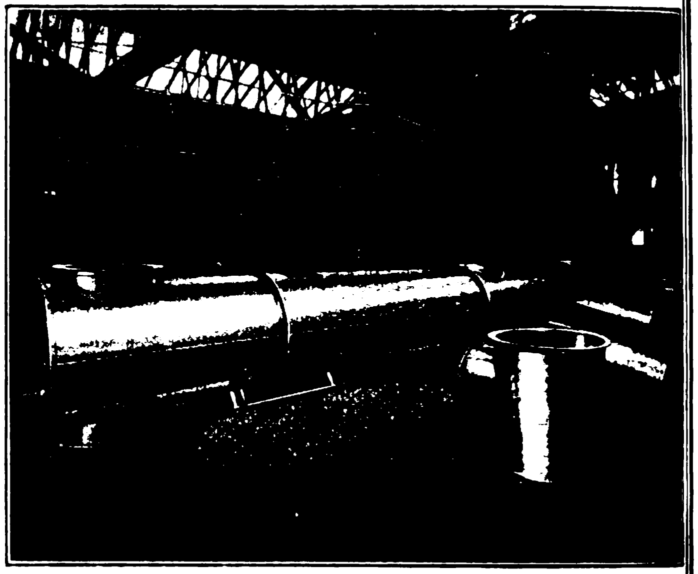

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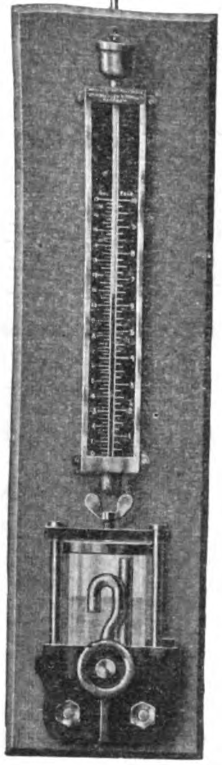

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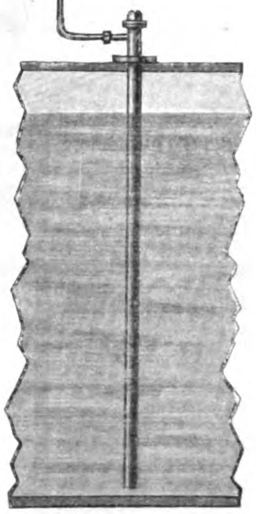

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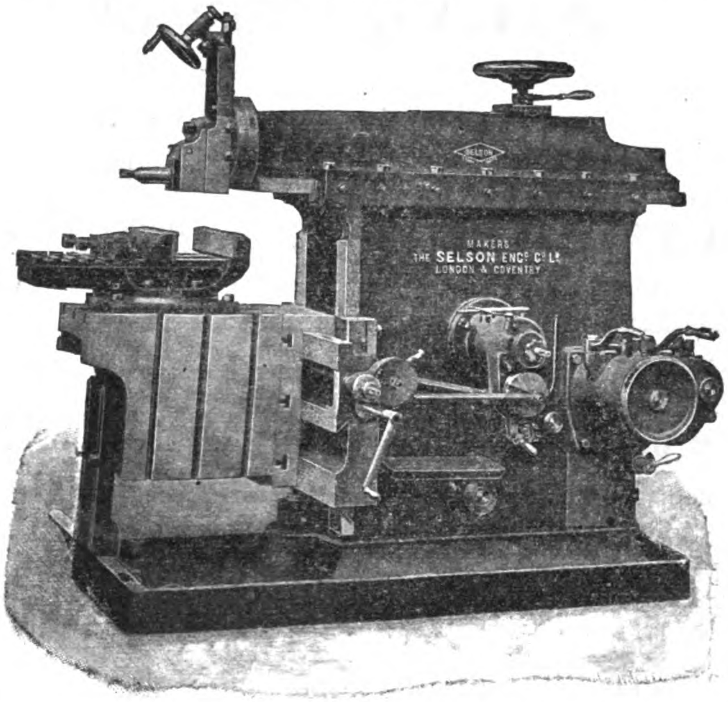

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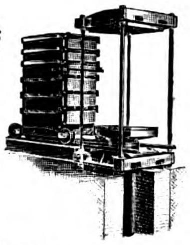

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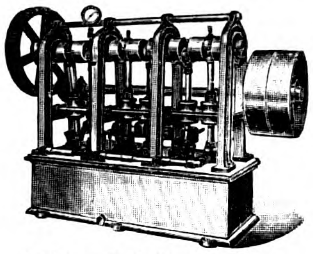

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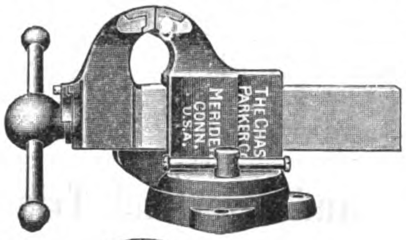

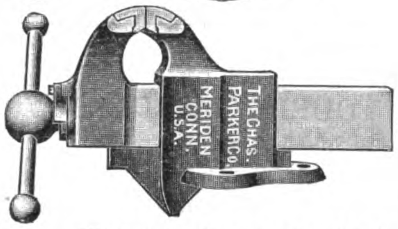

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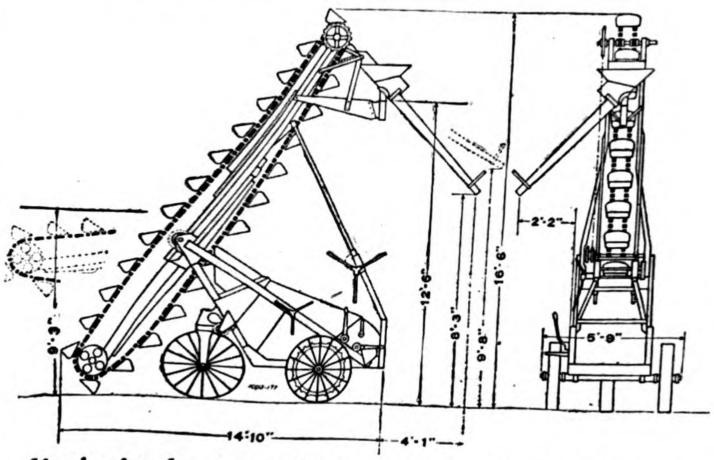

Line drawing showing the clearance dimensions of Jeffrey Type "K" Radial Loader.

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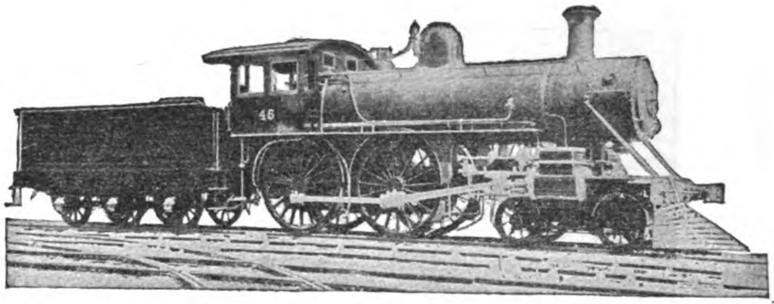

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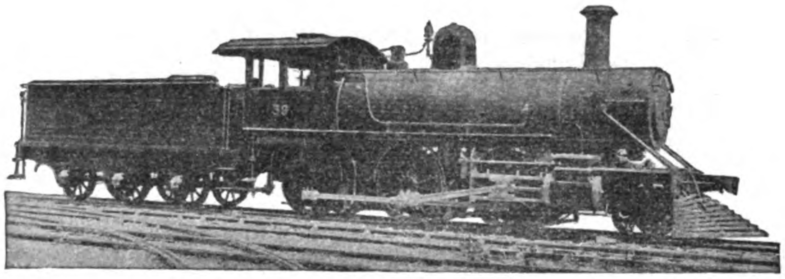

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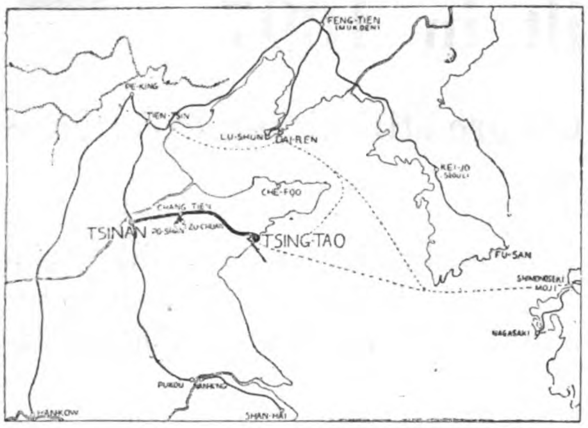

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Through passenger tickets are issued between the following principal stations of the Shantung Railway: Kiaochow, Kaomi, Fangtsu, Weihsien, Chingchow, Changtien, Choustun, Tsinan, Tzuchuan, Poshan, and the following points: In Manchuria—Port Arthur, Newchwang, Liaoyang, Fushun, Mukden, Tiehling, Kaiyuan, Changchun, Penchihu, Antung, and Dairen; in Japan—Tokyo, Yokohama, Nagoya, Kyoto, Osaka, Kobe, Ujina, Moji, Shimonoseki, Nagasaki and Shanghai.

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For giving facilities to through passengers for Japan, a special train in connection with the night train No. 4 is operated from the Harbour Station to the Wharf, direct alongside the ship, on those days when the liners of the Nippon Yusen Kaisha, Osaka Shosen Kaisha, and Harada S.S. Co. are leaving.
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At present the daily output of Tzuchuan coal is about 1,500 tons, far surpassing the amount taken out when the Germans were in control. The coal is well-known for its good quality and fair price.

Tsinan—Tsinan, the capital of Shantung, is the western terminus of the Shantung Railway, and also one of the most important stations on the Tientsin-Pukow Railway.
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Train No. 1 leaves Tsingtao daily 8.00 a.m. arrives Tsinan 6.30 p.m.
Train No. 3 leaves Tsingtao daily 9.30 p.m. arrives Tsinan 8.30 a.m.
Train No. 2 leaves Tsinan daily 8.00 a.m. arrives Tsingtao 6.30 p.m.
Train No. 4 leaves Tsinan daily 11.00 p.m. arrives Tsingtao 9.30 a.m.

Local Trains run between Tsingtao and Kaomi, Weihsien and between Fangtzu and Tsinan, and on the Poshan and Tzuchuan colliery branches.

Fares—Tsingtao-Tsinan—1st class, $14.30 ; 2nd class, $7.20.

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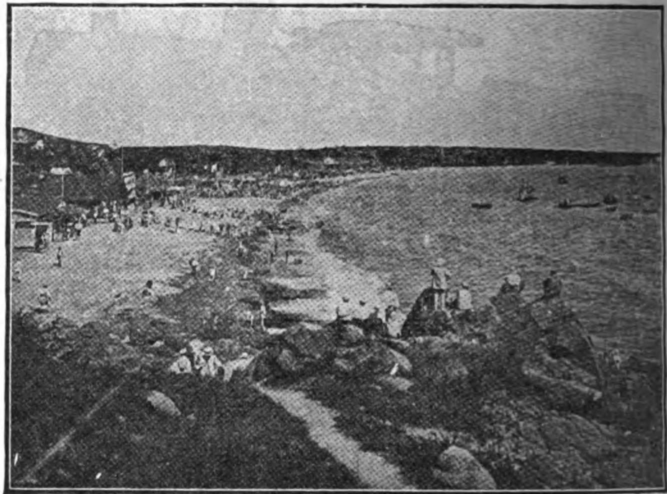

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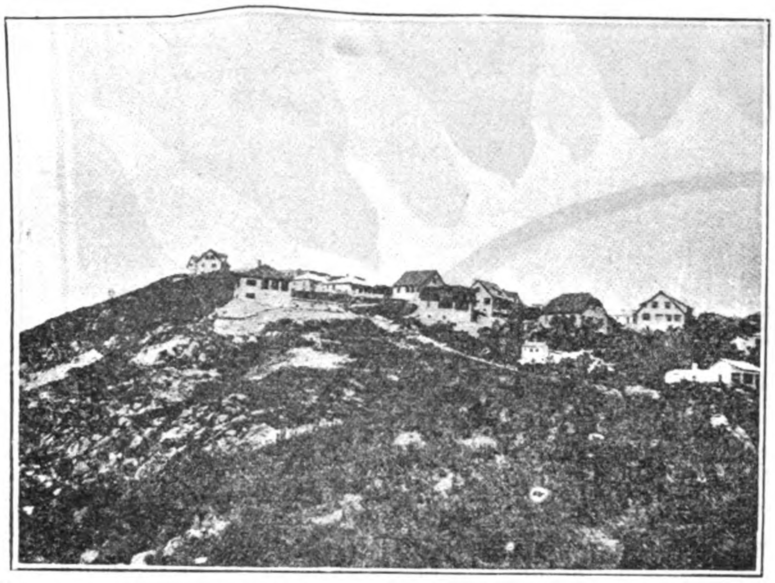

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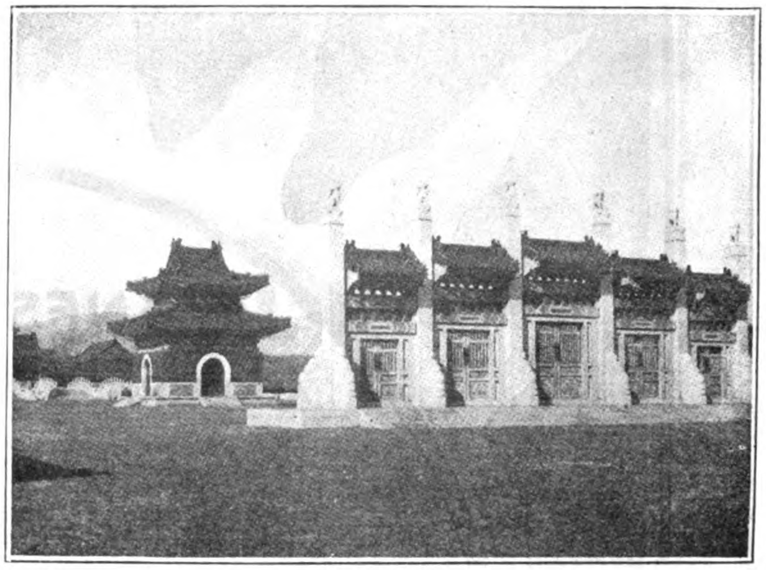

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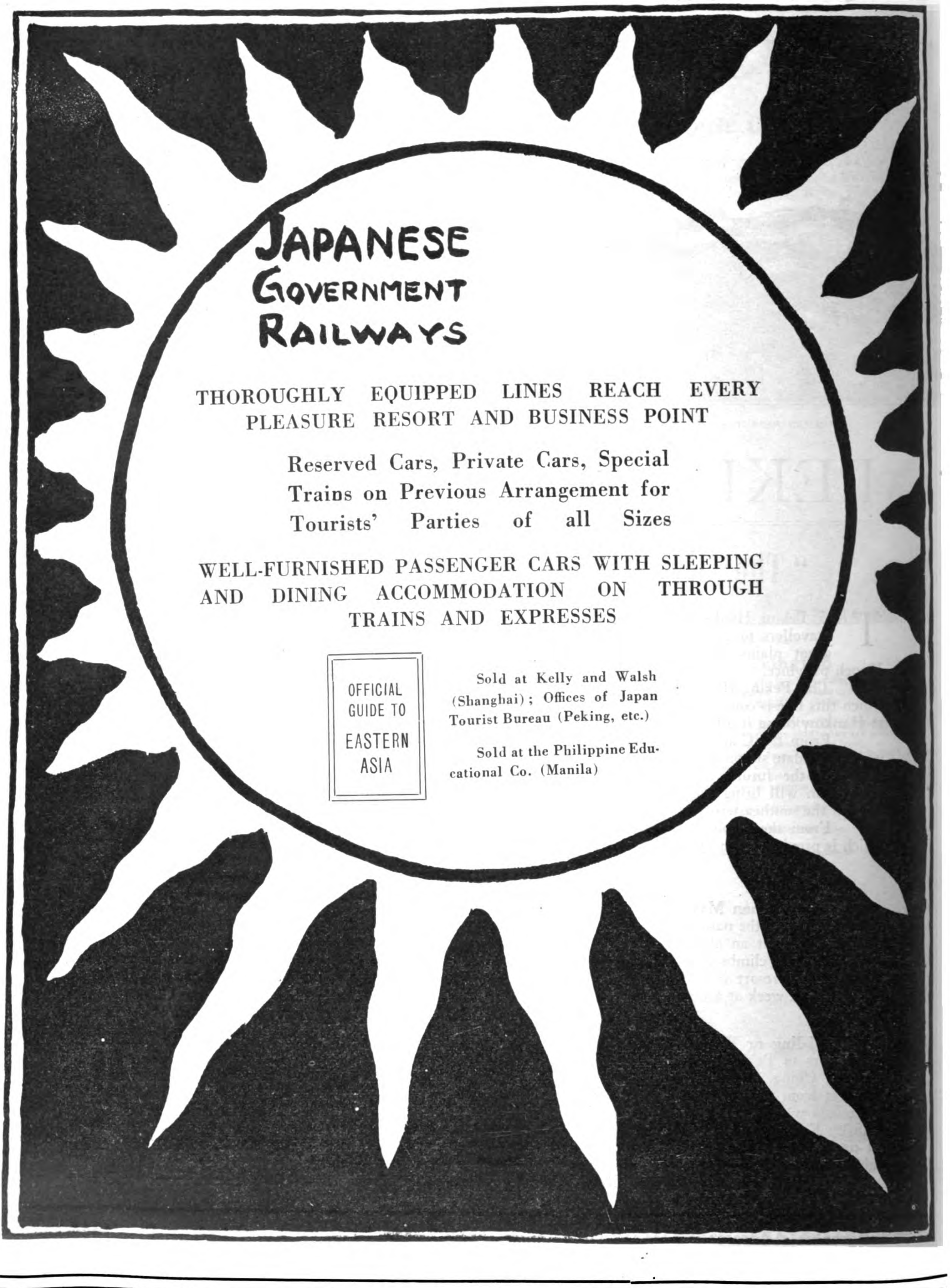
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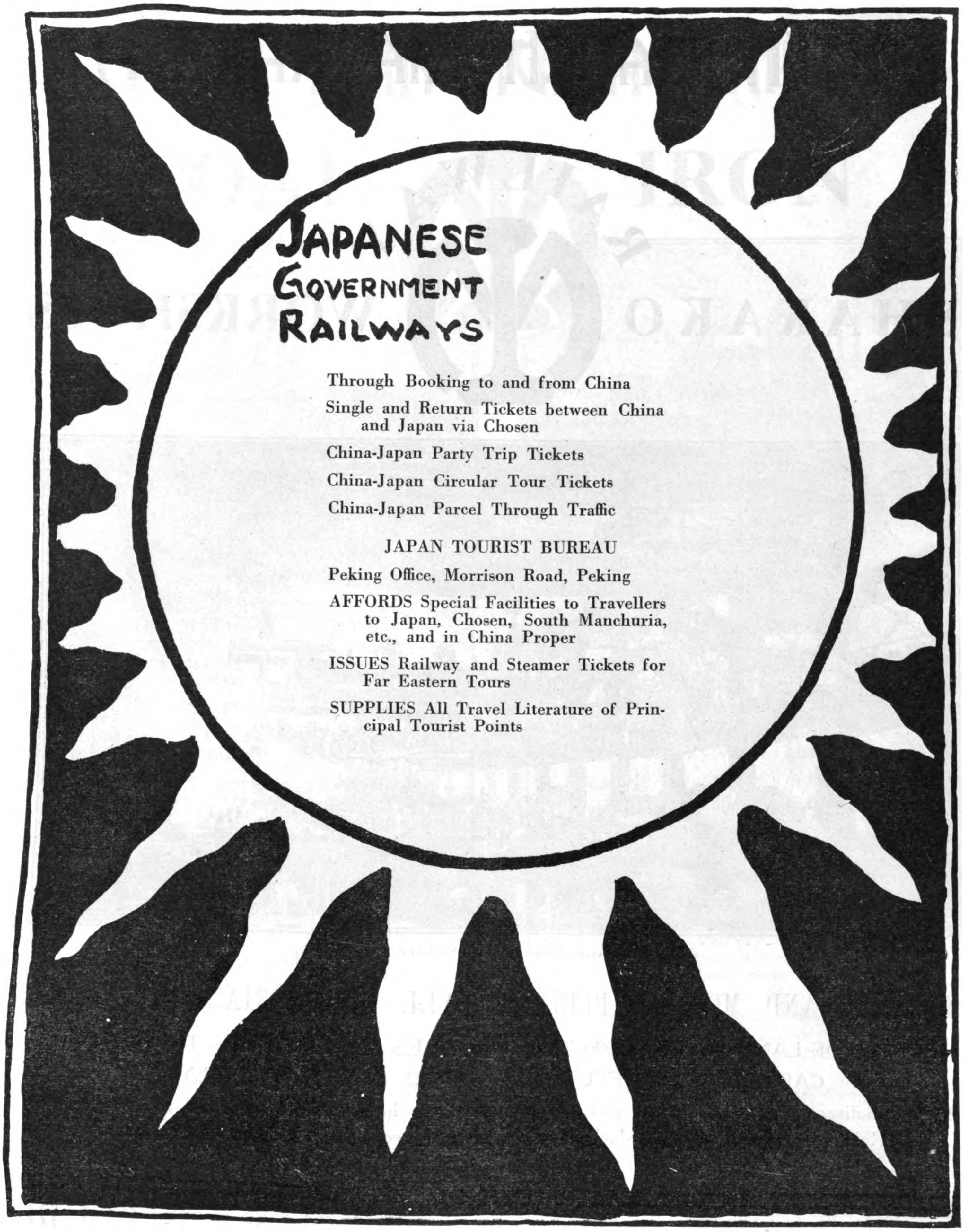
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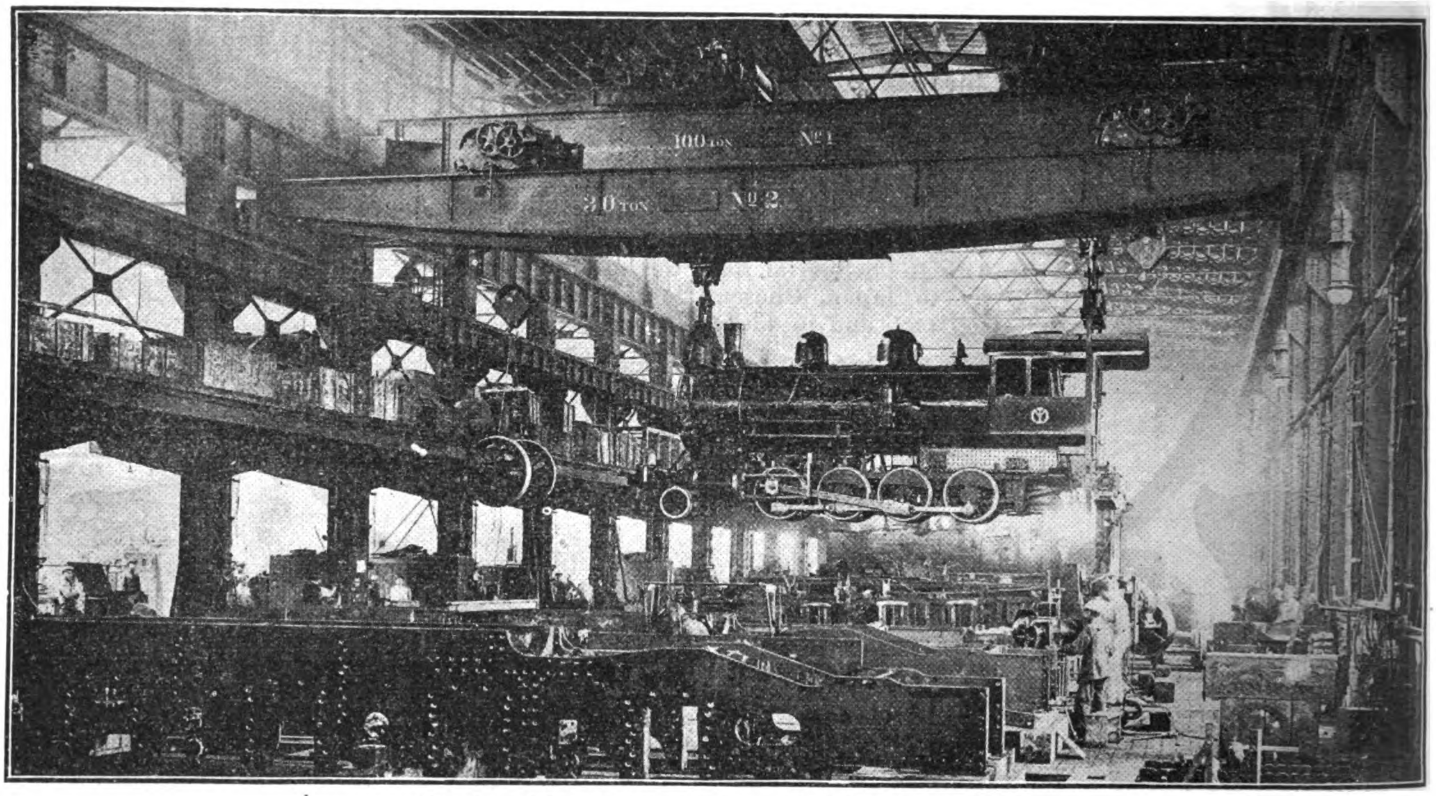

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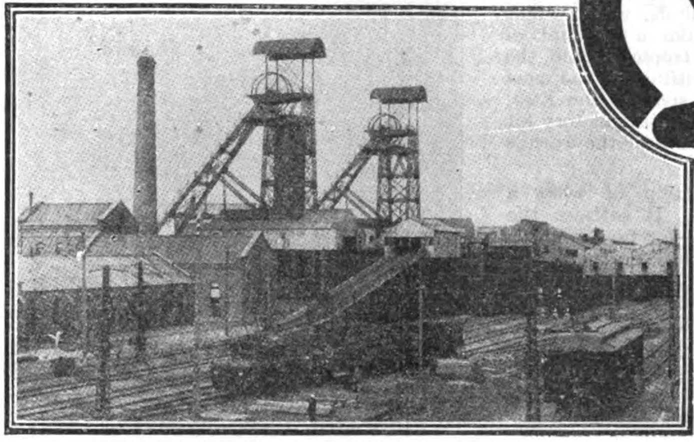

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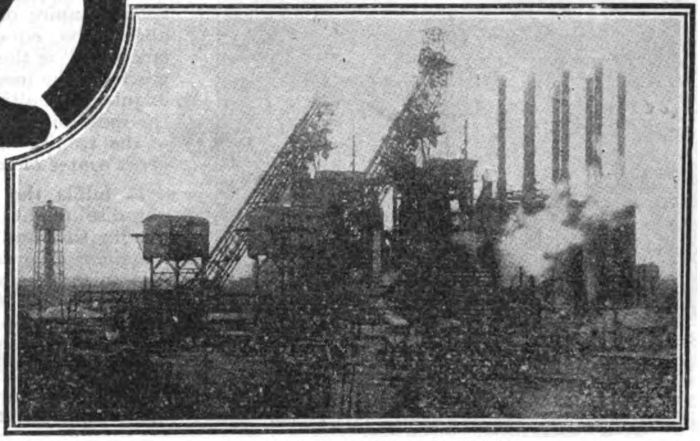

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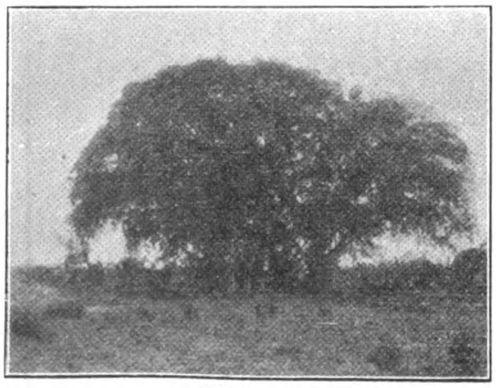
Bridge Bi Cis, Soerabaia Goods-shed, Java State Railways, Soerabaia City.

Girl Carrying Capoc.



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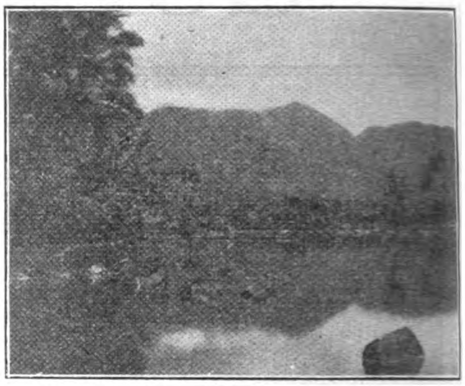
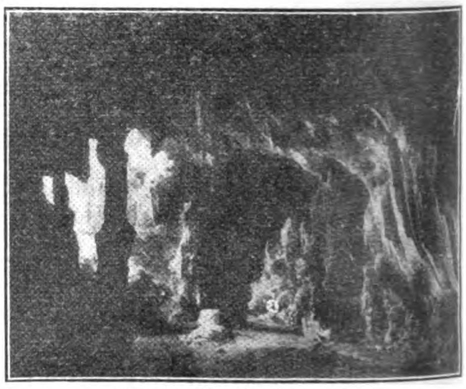


Pond in the Neighborhood of Garoet.

River Brantas, Malang.



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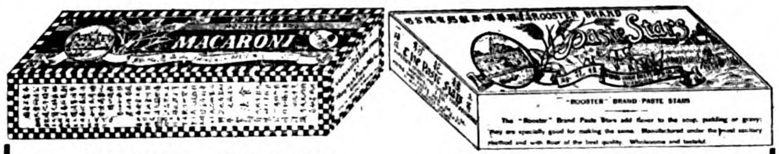

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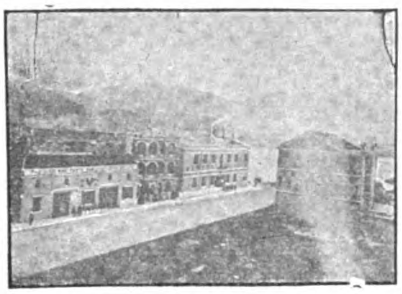

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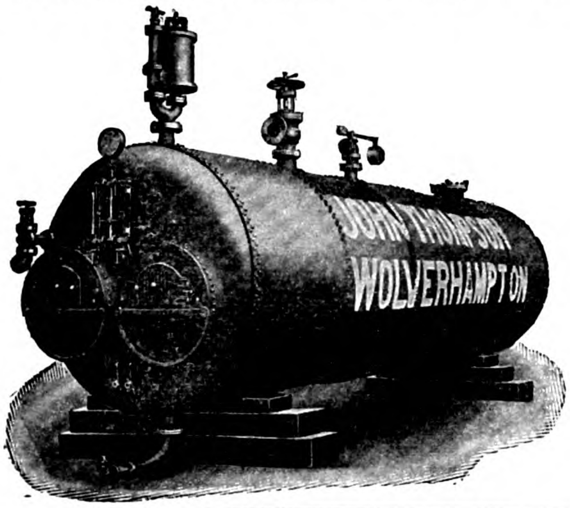

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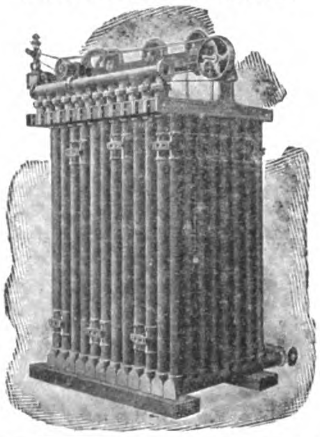

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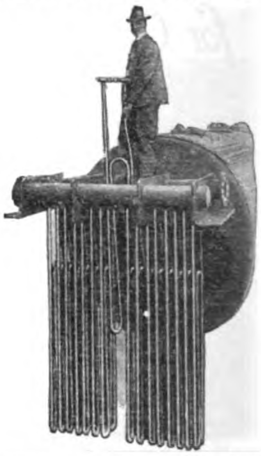

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FIG. W3253
GLOBE CHECK VALVE

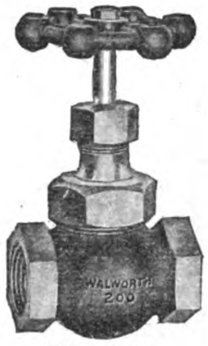

FIG. W3251
GLOBE VALVE

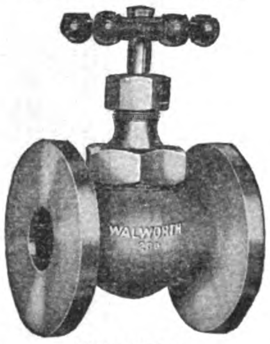

FIG. W3261
FLANGED GLOBE VALVE

FIG. W3252
ANGLE VALVE

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The Far Eastern Review Supplement

JAPAN'S RIGHT TO EXIST

AN ANALYSIS OF THE PACIFIC PROBLEM

A SOLUTION

By Geo. Bronson Rea

NOVEMBER, 1921

Supplement to

The Far Eastern Review

SHANGHAI, NOVEMBER, 1921

JAPAN'S RIGHT TO EXIST

An Analysis of the Pacific Problem

By GEO. BRONSON REA

1. What interest, other than the right to equal trade opportunity has America, Great Britain or France in Manchuria and Mongolia?

2. Does the pursuit of equal trade opportunity confer the right to interfere with the vital policy of another nation whose continued independence depends upon constant vigilance and preparedness in these regions?

3. Is the right of one nation to equal opportunity in the trade of another, paramount to a neighbor's right, to defend its independence against the preparations of an overwhelmingly stronger foe to re-open an old struggle?

4. Can the right to equal trade opportunity be evolved into a doctrine guaranteeing the permanent territorial integrity of a nation who surrenders its sovereignty and becomes the secret ally of one neighbor in order that another neighbor may be more readily attacked, humiliated and brought under the yoke of the stronger?

5. Can the right of one nation to equal opportunity in the trade of another be made the supreme international law and expanded to the point where the latter's sovereignty is to be guaranteed at all costs, and at the expense of others? In other words, is the doctrine of the "open door" in Manchuria paramount to Japan's right to exist, or, *vice versa.*

6. Can any agreement between various powers establishing the right to equal opportunity in the trade of another nation become operative unless ratified and lived up to by the nation concerned?

7. Has not the failure to recognize this fundamental principle, been the direct cause of the break-down of the "open door" policy and its evolution into a doctrine of international co-operation with its present trend towards international intervention?

8. What benefits can other nations derive from an understanding amongst themselves for the establishment of principles governing trade opportunities in China, unless the Chinese government becomes a party to the agreement?

* * *

IS Japan to retain her inalienable right to defend herself in Manchuria, Mongolia and Siberia against the moves of a stronger power, or is this basic law of nations, to be ignored and set aside in order that other nations may acquire concessions which tend to hamper and nullify her measures for defense in these regions? These questions the Pacific conference will be called upon to answer. THIS IS THE CRUX OF THE PACIFIC PROBLEM, a conflict between trade, capital, sentiment, ideals, prejudice and ignorance on the one side and the instinct of self-preservation on the other.

The problem of Asia has been and will continue to be for many years to come, RUSSIA. The century old struggle for its domination is adjourned until Russia is consolidated under a stable government. Then, she will start in just where she left off. The great war just terminated, only postponed for a number of years the conflict in Eastern Asia that Russia was so assiduously preparing for up to the hour of the downfall of the imperial régimé. When the truce of the Bear is broken, Japan will be called upon again to fight for her existence on the plains of Manchuria and the deserts of Mongolia. It is a good time for other nations to give pause and review the facts surrounding this mighty conflict of races and creeds, and decide once for all, whether their right to equal trade opportunity in the cockpit of Asia is paramount to the duty of Japan to defend herself.

The nations of the world in conference assembled at Washington are facing an epoch-making decision. The fate of Asia hangs in the balance. As Japan goes, so goes world power for the next century. Japan's late allies can bind her to them irrevocably, or, they can insist on interfering with her in Manchuria and Mongolia, and isolate her to such an extent that in sheer desperation she may be forced into the arms of the Teuton and the Slav. Such a combination would dominate Asia. If Japan is to remain the ally of Britain, America and France these powers should recognize and respect her vital problems in the same manner and in the same spirit that they have recognized and respected their own, in the same spirit that other nations have admitted the rights of each other to apply doctrines for their own preservation. If the Monroe doctrine is to apply in the Western Hemisphere, the Manchurian policy of Japan should apply in Eastern Asia. Any attempt to override this right of one nation to defend itself, while other nations are permitted to apply similar policies in other parts of the world, will bring its just rewards. Isolation of Dai Nippon

in 1921 may be the first step in a long-drawn-out struggle that may terminate forever the ascendency of the Anglo-Saxon and bind civilization to the chariot of a new combination of Teuton, Slav and Mongol.

* * *

Are the Japanese justified in the belief that efforts are being made to circumscribe their right to self-defense? In default of official assurances to the contrary, the Japanese, like other people, form opinions from actual occurrences and what they read in the public press. It is therefore extremely unfortunate for the preservation of a friendly understanding between America and Japan that our activities in Manchuria all seem to strengthen the idea that their right to defend themselves in that region is being circumscribed. To cap a long series of misunderstandings over Manchuria, and just as the Pacific conference is about to open, news comes from Paris that American financiers are expected to arrive there to reorganize the Russo-Asiatic Bank which holds the concession for the Chinese Eastern Railway. At the same time comes the further report that internationalization of this line will be brought up for discussion at Washington. These reports may have no foundation, and Mr. John F. Steven's visit to Washington to attend the conference may have no particular significance, but the Japanese cannot be blamed from piecing facts together and drawing conclusions. The possibility of the internationalization of the Chinese Eastern Railway has naturally provoked considerable discussion, and American activities in Manchuria since the termination of the Russo-Japanese war are reviewed with the object of emphasizing that a consistent American policy is being adhered to in these regions, that in the long run can only result in laying Japan open to future attack.

Japanese comments go back to the days when Mr. Harriman tried to purchase the South Manchuria Railway, or, failing in this, to make her position in Manchuria untenable through competing railway rights. The light shed on the motives of Mr. Harriman by the published letters of the late Willard Straight reveal that the Chinchow-Aigun Railway concession was to have been employed as a lever to force Japan to sell out the South Manchuria line to Mr. Harriman or be placed in a most embarrassing position *vis-à-vis* her late antagonist, Russia. The Knox neutralization plan which followed, gave these negotiations the appearance of having been part of a policy to handicap Japan in her efforts to defend herself. The *Osaka Mainichi* carries the comments further and adds:

"Both the projects failed because of Japanese and Russian opposition. Eight years after, in March, 1917, America concluded a secret contract for a loan of $500,000,000 with the Kerensky government. In consideration, Russia agreed to employ American engineers, American materials, give Americans the rights of forestry and mining and of using ports. While we may refrain from joining others in indulging in invectives against America for pretending to be working for humanity and justice but really entertaining great ambitions, we maintain that the foregoing three examples are facts of history for ten or more years past, attesting to the traditional desires of America in Manchuria."

The *Asahi* is just as outspoken:

"The solution of the Chinese Eastern Railway question will have a close bearing on the question of the South Manchuria Railway, and also the railways in other parts of China and Siberia. America began to pay attention to the Chinese Eastern Railway after the Russo Japanese war. Americans wanted a through world line, by connecting the Russian and the Manchurian Railway lines. The neutralization of Manchurian Railways as advocated in November, 1909, failed because of the strong protest by Russia and Japan. But at every opportunity, America has been putting her finger in the pie. When Russia disintegrated, a secret agreement was reached in 1917 between Kerensky and America for a loan on the security of railways, mines and harbors to be used by America, as everybody now knows. That was a part of the scheme of establishing a world through route. Mr. Stevens went to Siberia in order to carry out the plan as embodied in the secret contract. Because the Kerensky government fell, the American scheme fell through. But when the allies composed an international committee for control of the railways Mr. Stevens was appointed chief of the engineering section of the committee, which he has been ever since. We understand that Mr. Stevens' idea is to offer the Chinese Eastern Railway to the China consortium, America contributing the largest share of capital and for it securing the controlling share of interests of the line, Japan to be given a small section between Harbin and Changun. Will the American government take up that suggestion, and will France, the heaviest investor nation in the railway through the Russo-Asiatic Bank, acquiesce to such an arrangement?

"In view of the foregoing considerations, the Chinese Eastern Railway is likely to be controlled as America wishes. We maintain that if Mr. Stevens' plan should carry, it will be the easiest way to solve the problem, thus having the line placed under the joint control of Japan, China, America and Russia. We learn that our authorities are rather inclined to that solution. But we anticipate that the Chinese Eastern Railway question will develop in relation with other questions. It is very likely that the American way of solution of the question of the railway tacitly suggests America's policy in regard to China and Manchuria."

* * *

It is superfluous to point out that the consortium negotiations centering around the status of the Taonan-Jehol Railway concession and its inclusion into the international pool are still very fresh in the minds of the Japanese. It is not forgotten that the Japanese government placed itself on record that his line was designed for special strategic reasons, which, because of the weakness and disorganization of China, compelled them to extend their influence into this region in order to ensure the protection of their position in Manchuria against an "invasion coming from the direction of Urga"; in other words, an outer strategic zone for the defense of the empire against the onward march of Russia through territories, amputated from China in 1912. The weakness of China and the operation of the secret Li-Lobanoff alliance with Russia threatened to undo the victory gained by Japan at such a terrible sacrifice in 1905. The possession of the Taonan-Jehol strip became a life and death necessity to Japan, in the same way that possession of the Panama Canal strip became vital to the defense of the United States, as Gibraltar is to the British empire, as the possession of Tangier is now deemed essential to the safety of France. As there was little consideration paid by the United States to the rights of Colombia, as Britain ignores the just aspirations of [illegible] and as France aspires to the dominant position in Tangier, so in the case of Inner Mongolia, there was little consideration given to China who handed over Mongolia to Russia and paved the way for a resumption of hostilities, which Count Witte confesses in his memoirs, was scheduled by the Czar to break in the same year Sazanoff revealed the text of the secret 1895 Li-Lobanoff alliance between China and Russia at the Peace Conference. It was confirmed by Witte in his memoirs.* It was aimed at Japan. Its duration was fifteen years. When Japan attacked Russia in [illegible] the alliance was in operation, yet in the Portsmouth peace treaty China escaped any penalty other than consenting to and ratifying the transfer of the Russian rights in Manchuria to Japan. For strategical and political purposes, when China consented without a struggle to the amputation of Mongolia in 1912 by Russia, enabling the armies of the Czar to flank the Japanese position in Manchuria from its exposed side, she became the ally of Russia. Japan lost no time in demanding the right to construct the Taonan-Jehol Railway, setting to one side the previous contract entered into between the Chinese government and the American group for the Chinchow-Aigun Railway. Instead of retiring from a position which interferred with the right of Japan to defend her existence, the American government notified the Chinese government that it preserved its rights to the Chinchow-Aigun contract, and later on, in 1913, when the American group retired from the old consortium, a similar declaration of rights to this line was handed to Peking. Subsequent events as outlined by the *Osaka Mainichi* seemed to still further indicate a special interest on the part of the American government in this region, which could only be interpreted by Japanese as an interference with their right to provide guarantees for their future security. Notwithstanding [illegible]

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* "Count Witte's Memoirs" corroborate, in part, the Waichiaopu's [illegible] of the loss of the original Chinese copy of the treaty, which, they declare, was stolen with other state documents during the foreign occupation of Peking in 1900, and subsequently returned with important Chinese characters so altered that the meaning of the text was completely changed. Count Witte says: "The pillaging of the Imperial palaces was accompanied by the seizure of Chinese state documents of the highest importance. Among the papers taken there was, curiously enough, the original copy of the agreement signed in 1896 by Prince Lobanov-Rostovski and myself, on the one hand, and Li Hung-chang, on the other. It appears that the Empress Dowager attributed such a high importance to this document that she kept it in her bedroom in a special safe. When Peking was beseiged, the Empress was forced to flee from the palace in such great haste that she left the [illegible] document behind. At my recommendation, this agreement, which was so treacherously violated, was returned to the Chinese government.

strong position, Japan consented to surrender her undeniable right to self-defense by including the Taonan-Jehol strip in the consortium, trusting to the good faith of the other powers that her vital interests in Manchuria would never be placed in jeopardy through its operation. In the opinion of many Japanese, the internationalization of this line compromised all the powers, America included, to come to their defense by sending an army into these regions in the event Japan is ever again menaced by invasion from this direction.

Although this seems to constitute an ample guarantee for their security, intelligent Japanese realize that if the necessity ever arises, the armies of the other powers will be conspicuous by their absence from the zone of danger, and the full weight of resisting the Slav advance will fall again upon the armies of Nippon. Japan stands in the same position *vis-à-vis* Russia as France does to Germany. Like France, she must have some hard and fast assurance of assistance in the event she is attacked through Chinese territory, or, like France, she must provide her own guarantees. It is either one or the other. There can be no compromise on this life and death question for Japan. The hollow and specious argument that Russia is disintegrated, broken, and unable to come-back for another generation, and, therefore, Japan requires no guarantees, is hardly worth answering. Germany is in the same position, but France and Italy refuse to take any chances. Great Britain rejects this possibility and while others are talking about the millenium, has quietly protected the approaches to India against the day when Russia will once more take up her traditional policy in Asia. What is good for Britain, France and Italy, for America, is good for Japan, and to deny the latter the same rights and privileges when her existence is at stake, is the height of inconsistency, a gratuitous interference that lays her open to ultimate submission to Russia.

* * *

Notwithstanding the vital importance of the Taonan-Jehol strip to the defense of the Japanese empire against invasion from the direction of Urga, Japan's statesmen consented to its neutralization or internationalization in the consortium, thus depriving themselves of the right to protect their position while permitting Russia a free hand to work out her traditional policy in the hidden depths of Central Asia. Japan pinned her faith to the hope that the United States as the originator of the consortium scheme, will stand as a guarantor against the come-back of Russia, and, under given conditions, an American army will fight by their side in the depths of Mongolia against any attempt to crush their independence, or, if this hope should be impossible of realization, our moral support and sympathy would be theirs at such a crisis.

The Japanese general staff, however, entertain no such illusions, realizing that under no conditions will an American army ever disembark on the shores of Asia, and the safety of the nation entrusted to their keeping will depend solely upon its preparedness and ability to fight its own battles. At the time the surrender of the Taonan-Jehol strip was made, the Japanese general staff sensed that it would not be long before Japan would again be called upon to acquiesce in some further agreement that would hem them in on the north, and then, internationalized on both sides in Manchuria, an attempt would be made to compel them to evacuate Liaotung in 1923 and restore the leased territory to China. Recalling the efforts to force them to sell out the South Manchuria Railway, and placing them in an untenable position through competing railway rights, they very naturally view with misgiving any scheme to neutralize or internationalize the Chinese Eastern Railway, which completes the barrier to their defense activities and hems them in on all sides. Internationalization of the Taonan-Jehol strip and the Chinese Eastern Railway zone, they declare, provides an instrument which can be employed to exert a powerful pressure upon Japan in South Manchuria, which, under given conditions, could be directed towards undermining the economic and strategic value of the South Manchuria Railway, and prepare the ground for a re-opening of the rejected American scheme to neutralize or internationalize all the Manchurian railways. Lacking positive assurances to the contrary, in view of all that has transpired to date, it is natural for Japanese to incline to the belief that the trend of American policy may lead to a revival of the Knox neutralization scheme.

Certain strength is given to this theory by the efforts of the Russian general manager of the Chinese Eastern Railway to have all exports from Northern Manchurian regions pass through the port of Vladivostok, a campaign which Chinese merchants in that region have acclaimed and promised to support. In fact, the latter, desirous of injuring Japan, are eager to ship their produce through Vladivostok, rather than Dairen, in order, as they contend, to save the expense and inconvenience of transhipment at Changchun, made necessary because of the difference in the railway gauge. A propaganda is now being carried on by the Chinese amongst their fellow business men in Northern Manchuria to route all their shipments over the Russian Chinese Eastern Railway, instead of using the Japanese South Manchuria line. The Japanese line is therefore being made the target of a campaign to destroy its commercial value, and unless it can extend its standard gauge tracks to Harbin and compete on even terms for the traffic, the final outcome to such a situation can be clearly forseen. With the Chinese Eastern Railway under international management, tapping the country as far south as Changchun, the way would be paved gradually for undermining the commercial value of the Japanese line and compel the latter to listen favorably to a proposition to sell out or get out of Manchuria. So it will be readily seen that not only from the strategic but from the purely commercial standpoint, Japan must view with grave concern any discussion to internationalize the Chinese Eastern Railway without consulting their interests.

Many prominent Japanese are ready to accept any solution of this problem which will not place them at a disadvantage or diminish the value of their investments in South Manchuria. They realize that any understanding that will bring new capital into China and especially Manchuria, for developing its railways and resources will confer a great benefit upon Japanese trade, and because of Japan's geographical position will enable them to successfully compete with other nations. This element, while not opposed to internationalizing the Chinese Eastern Railway, insist that the principle of equal opportunity must apply in order to enable Japan to compete on even terms for the carrying trade of Northern Manchuria and Siberia. This, in their mind, must take the form of extending the South Manchuria Railway to Harbin, and a unification of the gauge of all railways in that region, so that the standard gauge cars of the rest of China can have ready access to the commercial centre at Harbin and other regions tapped by the Chinese Eastern line. They point out with considerable justice, that although the South Manchuria line would profit, the Chinese government railway system would also benefit by facilitating an exchange of standard gauge rolling stock and make possible through shipments from one corner of China to another. Other Japanese express themselves very forcibly to the effect that not only should the Chinese Eastern line be converted to standard gauge, but all other lines in Siberia as well.

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On the other hand there is a limited circle of thoughtful Japanese enjoying a more intimate knowledge of Manchurian affairs who adhere to the viewpoint that no matter how much Japan concedes in order to meet American desire for a free hand in Manchuria, any understanding that may be arrived at in Washington which internationalizes the Chinese Eastern Railway under American technical supervision, will develop into a policy that must ultimately thurst them out of these regions. These Japanese do not question the good faith of the American government, who they feel are guided in these matters by experts, who are either pronounced Sinophiles or in the pay of the Chinese

government, and therefore cannot be expected to sympathize with Japan's position, or, if they do, are committed to a program looking towards her humiliation.

These students of the situation believe that operation of the Chinese Eastern Railway under an honest and efficient international board, will lead to a propaganda for the extension of the principle to the South Manchuria Railway. No matter, they contend, how honest and fair the administration of this line, the secret charges of "discrimination so subtle that no proofs can be obtained" will continue to be made in order to create a sentiment favoring international control of the line. Every American or foreign trader who goes into Manchuria illy equipped to compete with the Japanese will attribute his failure to some underhand practices of which he has no actual proof, but is sure have been employed to ruin him.

If South Manchuria is internationalized along its western confines and then walled in on the north, what assurance have we, urge these Japanese, that an agitation will not be carried on along old familiar lines to compel us to hand over the South Manchuria Railway to international control. These absurd stories of discrimination so subtle that no proofs can be procured will continue to circulate now that the keynote has been struck, and Japan will in time wake up to find herself the victim of the most unjust and subtle campaign ever set in motion to besmirch the prestige of a nation. Unable to set herself straight, through ignorance of the charges against her, Japan will face the moral isolation of the world, and forced under weight of overwhelming pressure to surrender the fruits of her sacrifices in Manchuria. So no matter what we may do to comply with the wishes of the Americans, we cannot escape slow strangulation of our national aspirations.

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With the above facts before us, it is not difficult to grasp the inner working of the Japanese mind towards any proposition to internationalize the Chinese Eastern Railway. The so-called inscrutability of the Oriental is not very different from the Occidental, after all. The instinct of self-preservation is the same the world over. Other nations may be actuated by the highest motives and utmost good faith in trying to erect an international stone wall around Japan's position in South Manchuria, but so long as Russia's future policy remains a matter of conjecture, and China continues in a state of chaos, unable to provide guarantees for the safety of Japan, and the consortium powers abstain from entering into any hard and fast agreement to support Japan in a crisis, then in all fairness, the world must concede to Japan the right to apply principles which other self-respecting and virile nations have found necessary for safeguarding their own vital interests.

Intelligent Japanese are the first to admit that their government has committed many unpardonable blunders in the application of their basic doctrine. They severely condemn the tactics of the general staff in usurping the functions of the foreign office and imposing its will upon the empire. This element is unanimous in praise of the army for its past great sacrifices and services to the empire, but resent its interference with foreign policies. On the other hand, the militarists answer, that had they failed to dominate the policies of the government, Japan would have slipped back into a state of military unpreparedness and fallen an easy prey to Russia. They contend that had the reins of power been handed over to the people through the Diet after the Treaty of Portsmouth, Russia would have re-opened the struggle before 1912, the date set by the Czar for revenge. Only by constant vigilance and burdening the empire with further taxation and debt could the Japanese army be maintained in strength and efficiency to keep pace with the vast preparations of Russia to resume the conflict, a situation, they contend, that continued as long as a stable government existed in Russia.

Militarism, or military preparedness, was forced upon Japan by Russia, and had the general staff relaxed its vigilance, the empire by this time would be a thing of the past, enrolled as a dependency of her powerful neighbor. This ever present fear of Russia, the necessity of being constantly prepared on a war footing to meet the coming shock is the reason for the existence of Japan's great military establishment. Instead of an instrument for aggression it constitutes Japan's bulwark of defense. When the tables were turned, and the Colossus of the North tumbled from its pedestal, the Japanese general staff saw its opportunity to fortify their position and provide guarantees against a menace that had haunted them for fifteen years. This explains in part Japan's much criticised policy in Siberia, the reason, why, contrary to the understanding with the United States, a large Japanese army has remained in these regions at a time when Bolshevised Russia was threatening to overrun Asia. In pursuit of this policy it is asserted that Japan has expended over Yen 1,250,000,000, or more than half the profits accrueing to the nation as a result of the war.

Foreign critics who refuse to admit Japan's precarious position, prefer to see in the policy of her general staff a deep laid scheme on the part of Big Business in Japan to acquire valuable concessions in Siberia through the medium of the army. This viewpoint, however, must disappear when it is known that Big Business in Japan is lined up solidly against the military party, opposed to an adventure which is depleting the gold reserves so urgently required for industrial and commercial expansion. Few indeed are the business men in Japan who uphold this squandering of the national wealth in an adventure which up to date has injured rather than advanced their interests in these regions.

The answer of the Japanese general staff is again to the point. They invite attention to the fact that when past expenditures for the maintenance and expansion of the army are added to the cost of the Siberian expedition, the sum total is the price that Japan has had to pay because of Russia's preparations to renew the conflict of 1905, the price of Japan's continued existence as an independent entity.

They also invite attention to the fact that China was not called upon to pay any indemnity for her part in an alliance, which made the war with Russia possible, other than the transfer of Russian rights to the South Manchuria Railway, a property without value, utterly destroyed during the war and rebuilt at Japan's expense. They also declare that the inability of China to protect her neutrality has permitted Russia a free hand to pursue plans for revenge and burdened Japan with the enormous upkeep of a huge army for a period of over fifteen years. If this be true, they contend, then this huge expenditure, in addition to the cost of the Siberian expedition, has been forced upon the Japanese tax payer by the failure of China to perform her obligations as a neutral neighbor. Upon China, therefore, they maintain, falls the sole responsibility for Japan's so-called militarism. As long as this condition exists they must maintain an efficient force to move quickly in the event that "the menace from the direction of Urga" ever again starts on its eastward march.

These are facts that others must ponder over. If the Japanese are to be internationalized on the west, and the Chinese Eastern Railway placed under international management, we cannot blame them from protesting against the menace that this holds out to their strategical position in South Manchuria and the injury to the economic value of their railway.

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THE FAR EASTERN REVIEW has been consistent in its policy on these questions, adhering firmly to the conviction that insistance upon the right to concessions in these regions, neutralizing Japan's basic policy of national defense, should be followed by some assurance of support to Japan, if she is ever attacked. As it is out of the question to expect the American people to take an active part in such a struggle, the least we can do is to assure Japan of our moral and material support in other ways. International control of the Chinese Eastern Railway under an administration headed by an American, carries with it the obligation to provide a large part of the police for its protection, and here again it is unwise to assume

the American people will ever consent to its army doing police duty in regions where armed bandits operate at will in organized bodies defying all efforts to suppress them. The Hunghutzes are the real rulers of Manchuria, outside the precincts of the walled cities and towns, and even here, their influence and power holds the people in a state of abject terror. The Hunghutzes of this region constitute an *imperio en imperium* on a scale never dreamed of by the Russians and Japanese within their railway zones. This state of affairs has existed for years, and from press dispatches dated, Harbin, October 20, the Hunghutzes are still on the rampage, to the extent that forces from the Far Eastern Republic are reported to be concentrated on the border waiting for a favorable opportunity to proceed to Harbin to protect Russian interests. Until China can guarantee that the three eastern provinces and Eastern Inner Mongolia will be maintained free from the depredations of these organized armies of desperadoes, there can be no protection for foreign capital in these regions unless provided by Japan. Internationalization of the Chinese Eastern Railway means international police protection, the employment of at least three American regiments, whose presence can only tend to increase existing friction and suspicion.

China is in no position to furnish the necessary protection to American capital. To permit Russia to resume her military status at Harbin would be the height of folly, a further provocation to Japan. Therefore, if Americans must go into Manchuria, let it be done with our eyes open. If the arguments of those who favor this solution are to prevail, prudence and common sense demands that Americans should find some basis for harmonious co-operation whereby Japan and China will provide protection to the investment. Unless some such plan of co-operation is evolved as a solution to this problem the investment of American capital in the Chinese Eastern Railway, can only lead to difficulties in the future.

Any readjustment of the Manchurian situation must carry with it a complete change of policy on the part of all the powers towards China. In effect, the West has said to Japan that her children may not enter its territories on an equal footing with the white races. Debarred from countries bordering the Pacific, and facing the impossibility of competing with other Asiatics in their own country, if they wish to emigrate the Japanese, must perforce flow into unoccupied lands in Manchuria and Mongolia. Here they are faced with the difficulty that foreigners may not own land or engage in agriculture or commercial pursuits outside the limits of the treaty ports. The door is closed to them. One of the objects of the Twenty One Demands and the treaties arising therefrom, was to overcome this difficulty by conceding to Japanese the right to reside, travel and engage in agriculture and commerce of any kind whatsoever in these regions, and pending the establishment of a proper judicial system in China, held responsible before their own courts. Although on its face, the Manchurian treaty of 1915 concedes special privileges to Japanese subjects, the fact is overlooked that under the "most favored nation clause in the treaties" these priveleges extend to all other nationals. The point involved here, while seemingly striking at China's sovereignty, is one that has a most important bearing on the whole problem. For, if Eastern Asia is the only place for Japan's surplus population, they must have some guarantee that they will be provided with protection and permitted to exist peacefully. This protection, the Chinese authorities have so far been unable to provide, and Japanese, or other foreigners for that matter, who venture outside the limits of the larger treaty ports and the foreign controlled railway zone, do so at their own risk. As long as the bands of Hunghutze terrorize the three eastern provinces and make impossible any peaceful development of their resources, the practical benefits accrueing to Japan and other nations from the Manchurian treaty are practically nil. The powers say, in effect, to Japan: "you must seek your future in Eastern Asia, but on no account must you interfere with China in establishing law and order in the territories designated as an outlet for your overflow." The same dilemma will arise from internationalizing the Chinese Eastern Railway. Who will provide the guarantees to American and foreign capital that the line will be protected ; who will guarantee to Japan that her subjects (forced into this corner of Asia by the will of the powers) will be permitted to pursue their peaceful avocations ?

The problem is one that Japan cannot escape facing. If Japan is denied the privileges embraced within the Manchurian treaty of 1915, and the further right of extending justice and protection to her nationals forced to seek homes in these regions, and the right to defend her existence through internationalization of the Taonan-Jehol and Chinese Eastern Railway zones, the powers will have created a situation that calls for calm and dispassionate consideration.

It is no time to indulge in propaganda for the advancement of special or national interests. In the last analysis, China should be called upon to modify her traditional policy and throw open her waste spaces to development. Her interests must be carefully and securely safeguarded, under some form of international agreement that will compensate in part for this concession to the peace of the Pacific.

The Other Side of the Case

THE other side of the argument that Japan should be conceded colonization rights in Manchuria and Mongolia is being very ably presented by a score of publicists and statesmen, who, on the eve of the Pacific conference, have suddenly awakened to a realization that this is the fundamental issue involved in the so-called Pacific Problem. Brought face to face with the question involving the future of Japan, they seem utterly unprepared, however, to discuss facts patent to the whole world. Their arguments in the main are confined largely to either a denial that Japan is over-crowded or takes the form of objecting to special treatment for Japanese in Chinese territory embraced within Mongolia or the three eastern provinces.

THE FAR EASTERN REVIEW was quick to sense the importance attached to an equitable solution to this grave issue and has led the way in pointing out the necessity for some such outlet for Japan, in order to keep the racial problem where it properly belongs—in Asia. We have approached this subject, from what, to our mind, should be the broad American attitude. Our position is not pro-Japanese or anti-Chinese, but the common sense view of an American who protests against the long-drawn-out propaganda calculated to shove the racial issue across the Pacific, for America and Canada to settle.

Whether Japan is overcrowded or not at the present moment is beside the question. The fact remains that the highest thought in Japan holds that it is, and, at the present rate of increase, the time is not far distant when the doors of some other country must be opened to them. It is the supreme duty of a government to look ahead and provide for the future wants of its people, and as the doors of America, Canada, Australia, New Zealand and British South Africa are closed to the Japanese, with the Philippines enacting legislation designed to keep them from owning land, there remains only South America and Eastern Asia. It goes without saying that any large influx of Asiatics into the smaller South American states would in time be viewed with as much alarm as their entrance into the United States or Canada. There remains,

then, Eastern Asia, that is, Mongolia and Manchuria, but here again the door is slammed in their faces through the operation of Chinese laws which prohibit foreigners from owning land or engaging in business or agricultural pursuits outside the limits of the treaty ports. The same conditions, slightly modified, prevailed in Siberia. Although Japanese acquired as a result of the war with Russia, full rights to travel and reside in Siberia, the Russian police made life so intolerable for them that few cared to court the certain hardships that awaited them in this inhospitable land. We will refer to this briefly further on. Where, then, can Japan expect to find an outlet for a population increasing at the rate of 700,000 per year? Do we ask them to go up in the air, or colonize the slopes of Fuji? When a nation has its back against the wall, the day must arrive when it will gladly accept a conflict rather than practice race suicide. Herein lies the danger to Pacific peace.

Who will open their doors to the Japanese? If the United States and the British Dominions in the Pacific stand firm on their immigration policies, then the door must be opened in Asia. The wall will give way at its weakest point. China, however, objects strenuously to the use of Manchuria and Mongolia as fields for Japanese colonization. Here, then, we reach an *impasse*, to which, if no outlet is found, must bring about hostilities.

We hold firmly to the conviction that sooner or later Japan and China will be friends, if not actual allies. Japan is economically dependent upon China for raw materials and as a market for the sale of her manufactured products. Geographical propinquity will give to Japan (everything else being equal) a trade advantage which will permit her to successfully compete with other nations for the trade of China. With the doors of all other countries closed to her people (and to those of China as well) Japan is furthermore dependent upon China's good-will for the use of lands that will provide an outlet for her surplus. Injury to China through impairment of her sovereignty strikes at the very life of Japan; the downfall of Japan would be followed by the dismemberment of China. The two nations are inter-dependent. They have everything in common, and despite the continuous student agitation and hostility of politicians who capitalize this animosity, there exists a preponderating element of conservative Chinese who realize these truths and desire nothing better than to see the two countries work together in friendly understanding. We believe, therefore, that the present tense situation cannot be indefinitely prolonged, and the prospect of renewed friendship between the two peoples should be welcomed as the surest guarantee of peace and harmony in the Pacific.

We come to the question as to whether Japan should be conceded special colonization rights in Manchuria and Mongolia. These rights were provided for in the Manchurian treaties of 1915, but it is well to repeat and underline that under the most-favored-nation clause in the general treaties, these rights extend to all other nations as well, so cannot be interpreted as conceding to Japan any special privileges. The effect of putting the provisions of this treaty into operation would be to open these regions to international development and so provide a firm guarantee that China's integrity would remain intact. It is difficult to imagine that other nationals would seek to colonize regions in competition with Asiatics, so it would resolve itself into a peaceful competition or co-operation between Japanese and Chinese for agricultural rights, with the "open door" for all other nations to equal trade and investment privileges.

The one obstacle to the practical application of this treaty, is, as pointed out above, the difficulty in providing guarantees that law and order will prevail, that colonists and investments would be safe from the depredations and exactions of the rulers of the land, the Hunghutze. Under present deplorable conditions (and they seem to be normal), Manchuria and Mongolia are worthless as spheres of colonization or investment to any people. Here is where it seems that China and Japan are drawn closely together and any solution arrived at, must result from mutual concessions. In effect, special rights to Japan in these regions, means in its last analysis, internationalization, or throwing open the whole territory to international exploitation and development, and it remains for China, Japan and the powers to agree amongst themselves how this protection can best be provided. Unless China can give some guarantee of her ability to comply with her international obligations in these regions, so capital can flow in and develop its resources, the powers must come to some agreement as to how this can be done, or the door is closed to their colonization and to investment.

The opposition on the part of China to throwing open Manchuria and Mongolia to development arises from a fear that her integrity may in some way be impaired by Japan. It is always Japan. No one ever thinks of the other side of this question, least of all the Chinese, nor do they wish to recall that when imperial Russia dictated her will in Asia, these lands, especially Mongolia, were held as closed spheres, barred against Chinese colonization or the construction of railways for their development. Yet in those days there was not a whimper from Peking, nor a protest from other powers

Let us go back a few years, and to gather the right perspective, let us turn page 108 of "The Memoirs of Count Witte," where we will find the policy of the old Russian military party concisely voiced by its spokesman, General Koropatkin. "*We will turn Manchuria into a second Bokhara.*" This is sufficient. Koropatkin's evidence has been supported by many others. Manchuria was to be closed to foreign trade and commerce, a secret base for the further conquest of lands belonging to China and cloak a Muscovite descent upon Korea and Japan. If Manchuria is still a part of China, it is because of Japan's tremendous sacrifices. If foreign trade and commerce is now carried on in this region on terms of equal opportunity, it is due to Japan.

Did Russia abandon this policy after her defeat by Japan? Let us carry the story down to the very day of the Russian revolution in February 1917. The American Siems-Carey Company obtained from the Chinese government a preliminary agreement for the construction of certain railways in May, 1916. The final agreement was signed on September 28. Two of these lines followed the Yellow River from Kweihwacheng to Lanchow, within the region known as Inner Mongolia. Five days after the terms of the final contract were given out in Washington, Russia protested against the construction of these lines, basing her opposition on a promise given by China in 1899 that only Russian money would be employed to construct railways in these regions. This was followed by a further official explanation to the American government that Russia could never consent to the construction of railways that would open Mongolia to Chinese colonization. *This was the heart of the situation.*

In the early days of January 1917, a few weeks before the overthrow of the Czarist government, I sat in the foreign office in St. Petersburg and listened to the foreign minister and three of his secretaries expounding for my benefit, the inner reasons for Russian policy in Mongolia. In effect, Russia trembles before the prospect of a "Yellow Peril," and her policy was shaped to keep the Chinese from overflowing in her direction. The maintenance of Mongolia as a buffer state, closed to the entrance of Chinese, was the keynote of Russian policy in Eastern Asia. As Stolypin put it, "You have your Monroe doctrine, which you consider vital to the existence of the United States, and you will go to war at a moment's notice in defense of this doctrine. The closing of Mongolia against the entrance of the Chinese, is Russia's Monroe doctrine, and we also will go to war at once if this doctrine is menaced by the operations of other powers in this region." The conversation is borne out by the official Russian protest read to me in Petrograd, and which must be on record in the American state department.

We might fill a book with references to support this phase of the question, but will conclude by quoting from a chapter on the "Yellow Question" in Dr. Friotjof Nansen's book, entitled, "Through Siberia, the Land of the Future," published after the outbreak of the war in 1914. After a very full exposition of Russian

timent against Chinese emigration, he adds : "one can understand the alarm of the Russian authorities of the danger that seems to threaten her ; and the employment of Chinese laborers is now forbidden in the Ussuri and Amur countries. Indeed, they may not even be employed in the construction of the Amur line, a prohibition which in the opinion of many appeared to involve insuperable difficulties. The originator of this anti-Chinese policy is the present governor-general of the eastern provinces, Nicolai Lvovich Gondatti, who enforces it with great rigor. I have already described how Chinese, whose papers are not in order, are summarily arrested and sent back to China" . . . " Against the Japanese the police cannot proceed in this fashion, much as they would like to do so. According to the treaty with Japan after the war, the Japanese have the same rights as the most-favored nations and may travel and reside where they please, although the universal belief among the Russians is that every single Japanese is a spy."

Dr. Nansen might have added in all fairness, that every foreigner who entered Russian territory in Asia without a special permit was considered as a spy, and this pertained and was enforced rigorously against a subject of Great Britain.

This is the only answer to China's objections to opening these territories to colonization. Chinese authority in Mongolia had been surrendered and taken over by Russia who very forcibly defended her position against any and all interference ; and she had her way. It seems superfluous to review at length subsequent history covering Mongolia except to emphasize that during the consortium negotiations both the United States and Great Britain insisted that Mongolia was a very essential part of the Chinese republic and could not be excluded from the scope of the agreement. In effect, a territory at that time in dispute, with China powerless to enforce her sovereignty, was formally declared part of China, a declaration, it would seem, that obligates the powers concerned to make good on. For all practical purposes, although recognized as an essential and integral part of Chinese territory, Mongolia became an international protectorate whose neutrality is guaranteed by all the consortium powers. Unable to defend her vast territory, China was forced to witness the placing into operation of that phase of the Hay doctrine providing, under given circumstances, for united action of the powers to give effect to the doctrine.

We find that Manchuria and Mongolia, for all practical purposes, have been internationalized under the consortium. The proposal is now put forward to internationalize the Chinese Eastern Railway. The Manchurian treaties of 1915 opens these regions to international development and the only special interests which remain are the Japanese South Manchuria Railway, its branches, commercial enterprises and lease to the Liaotung Peninsula. These constitute Japan's outer line of defense, held as vital to her strategical and economic welfare. From all appearances, Japan is prepared to surrender all other advantages derived from the imposition of the twenty-one demands, but stands firm on Manchuria. This constitutes a dead line, where liberal and military Japan come together, prepared to hazard their future existence by resort to arms if their position in Liaotung is again challenged.

But, the Chinese insist, "this is unjust. We were forced under an ultimatum to sign these treaties and informed the world that we could not recognize their validity. The American government is on record that it cannot recognize any treaties that impairs the rights of American citizens or infringes the doctrine of the 'open door.'" As to the American note of May 16, 1915, the Japanese point out that any advantages obtained by them as a result of these treaties are automatically enjoyed by American citizens. This they contend, would seem to take much of the ground from under American objections.

The question, therefore, resolves itself into one that concerns solely China and Japan, and here other nationals must be prepared to remain neutral and carefully weigh all facts in the case. Japan is in Manchuria as the direct outcome of the secret Li-Lobanoff alliance entered into between China and Russia in 1895. The fruits of Japan's victory over Russia are confined to the South Manchuria Railway and the lease to the Liaotung Peninsula, the strategic key and commercial base to Manchuria and Mongolia. Japan paid a heavy price for these advantages.

China's case is dogmatic, confined largely to an appeal for international justice and recognition of her sovereignty in these regions. Japan, answers, in effect, that China voluntarily surrendered this sovereignty to Russia in order that the latter might more readily attack Japan through Korea. Japan also points to the fact that Russia had determined to annex Manchuria and convert it into another Bokhara, a territory closed to foreign travel and trade. Japan defeated Russia and saved these regions to China. In the final settlement of accounts, China escaped paying any indemnity for her share in a deal which made the war possible, other than recognizing the transfer to Japan of the Russian rights to the South Manchurian Railway and the Liaotung lease. Japan adds, "we have rebuilt at our own expense a broken, busted, old railway, into one of the finest lines in the world ; through our own initiative we have developed industry and agriculture, creating the world-wide soya bean trade; we have developed Dairen from an unknown fishing village to the second port of China ; we have brought prosperity to the regions, so that, to day, Manchuria is the wealthiest province in China. You ask us to surrender all this and get out of Liaotung in 1923 and hand over the railway in 1935, in order that your sovereignty may be fully consolidated in these regions. What are we to receive in return for our sacrifices in saving this territory to China ?" It would seem that here is a question that can be settled only by a direct understanding between China and Japan.

It is difficult for other nations to take sides in such a question, for no matter how much we sympathize with China, Japan's case is equally strong and based upon her appeal to the last resort. Until China's side of the case is made clearer Japan stands in an invulnerable position. She says, in effect, that any settlement of this question must take the form of an acknowledgement of the *fait accompli*, or China's recognition of the 1915 Manchurian treaty, the compensation that Japan exacts from China for her part in bringing on the war of 1905. We repeat, here is where other nations must remain neutral, for this constitutes Japan's dead line, her last stand.

If China and the powers are ready to recognize Japan's position as embraced within the Portsmouth, Manchurian and consortium agreements, a basis is found for some equitable and practical solution to this perplexing problem. As far as we have been able to gather in many talks with Japanese financiers and merchants, this would meet with their full aspirations and bring about international financial co-operation in the development of these regions and open up sources of raw materials so urgently required for their industries.

No matter how we approach this problem, discussion must inevitably lead to a consideration of who will furnish protection to such investments and we again clash with the ideas of China. Up to this point, internationalization, or the opening of these regions to colonization and development, will not meet with opposition from liberal or commercial Japan.

The principal objections will come from China who will insist upon recognition of her full sovereign rights to exclude foreigners from enjoying the benefits arising from such development through the ownership of land, etc., or, if she concedes this point, will demand the right to provide the necessary police protection. In her present unhappy condition, it is hopeless to expect China to provide these guarantees, unless her forces are placed under foreign leaders. An international constabulary for the policing of these regions seems out of the question, so we come again to the stone-wall of how this protection is to be provided. The whole question hinges on this, for unless these guarantees are forthcoming, any attempt to open up the territories through international finance will come to naught. Until China is in a position to guarantee this protection, it would seem that the only solution is to rely upon Japanese co-operation in some acceptable form with Chinese forces. The whole problem bristles with difficulties and conflicts of authority and sovereignty, and as we look ahead to the time when Russia will again

be united under a central government, with her people seeking their future in Asia, the picture is far from reassuring.

Nevertheless, we are forced to admit that this is a possible solution, and compelled to advocate a program which holds out such practical possibilities. If Japan is to have an outlet for her surplus in Manchuria and Mongolia where China's sovereignty is to be recognized and upheld, and the "open door" assured, all other nations will breathe easier. If China had exercised her authority over these vast waste spaces of Asia and systematically carried out their colonization it would be difficult at this time to offer any justification for opening them to other peoples. As matters stand, to quote Mr. J. O. P. Bland, "Mongolia is like unto a house without a tenant." He might have added, that if matters are permitted to drift, this property will be held in trust for Russia and Germany, because of China's inability to consolidate her authority, a situation fraught with the greatest danger to the peace of America, by having for its ultimate outcome the forcing of the racial issue across the Pacific to the shores of Canada and the United States or southwards towards Australia and New Zealand. This is a condition that Great Britain and the United States cannot permit to pass by without notice. As long as these vast waste spaces exist in Asia and are held in escrow until such time as Russia and Germany are ready to take over their heritage, China or Japan cannot expect the other nations of the Pacific to open their doors to the Asiatic. Asia must first be developed before its teeming millions can be rightfully entitled to entrance into those other Pacific countries whose economic fabric would be destroyed by their admission. As long as China's sovereignty is fully recognized and guaranteed, her vital interests cannot be said to be impaired. In fact, the opening of these regions to development will strengthen her sovereignty, and in time, as she emerges from her present chaotic condition, her government will find a vast territory developed by foreign capital and serving as an outlet to her millions such as they could not expect to find elsewhere. Through the friendly co-operation of the powers China would come into full possession of an empire which otherwise would be closed to her through the operation of Russia's Monroe doctrine. If the program of colonization laid down by the present German government is to be adhered to, and her surplus shoved over into Russia and Siberia with a special eye on the development of the mineral resurces of the Altais, then the only counter move is to throw Mongolia open and permit the Altais to be developed from the other side as well. The world cannot view with unconcern any program which will again permit the closure of Mongolia to its colonization by Chinese.

As for Japan, her position would be strengthened strategically and economically, permit a reduction in her army expenditures and pave the way towards co-operation and a better and sympathetic appreciation of her problems. Japanese militarists might find grounds for opposing such a solution, but it may be safely said that Japan's financial interests holds the key to her future policy. We have every reason to believe that such a program would not be out of harmony with their oft-expressed desire for co-operation with America and China.

In advancing such a solution we are not blind to the responsibilities it will impose upon the United States and the other powers to bring pressure to bear upon Russia if at any time in the future she attempts to resume her old forward policy in Asia. It may be that Russia is chastened and will forego her old ambitions, but it is not a good reed to lean upon. Human nature does not change in five years. The internationalization of the Chinese Eastern Railway and its management under a board headed by an American and financed largely with American capital, carries with it unescapable obligations. Are we ready to shoulder these obligations with all that they imply ? If we are, let us do so with our eyes open and face the cold, stern realities of a solution that will obligate us, if the occasion arises, to assume a most active part in the maintenance of the peace of Central Asia.

China's Equity

In opening Mongolia and Manchuria under an international guarantee of China's unimpaired sovereignty over the regions, her vital interests are fully safeguarded. There enters, however, the question of whether the benefits to be derived from such development are sufficient to induce China to give full consent to such a plan. If territories under her sovereignty or suzereignty are to provide an outlet for Japan, as well as for international investment and exploitation, she may ask for something more immediately tangible that definite guarantees and the prospect of future revenue returns. China is desperately hard-up and might well insist upon some immediate cash benefit in return for this accommodation. Here it would seem that a wide field is open for negotiation, and compensation might take the form of a total remission of the Boxer indemnities in addition to tariff concessions. Here we are upon firm ground, for while in Tokyo, not a month ago, we were informed by Baron Ijuin, that Japan is not opposed to a remission in part or in whole of her share of the indemnity, once a united government is established in China, so that her action could not be misinterpreted. If the opening of these territories would also bring relief to the United States, Canada and Australia from the pressure of Asiatic emigration, it would serve as a further argument why Great Britain might also consent to the remission of her share, with total remission on the part of America. The recognition of China's right to increase her import tariff, with the offer of immediate financial assistance (once a stable government is organized) might also help towards bringing about such a solution.

The argument that China unaided can never hope to retain her sovereignty over Mongolia is a strong one. The argument that her present sovereignty over Manchuria is due directly to Japan is equally strong. These regions are Chinese to-day not through any effort on the part of China to defend her sovereignty, but through the costly sacrifices of Japan and the will of the consortium [illegible] who insists that they must remain integral and important parts of China. China has done nothing for herself. Her interests have been preserved so far on paper by others. At present, owing to China's impotence, these lands are being held in trust for Russia to [illegible] when the day suits her to move in. As far as actual sovereignty [illegible] ownership is concerned, although nominally vested in [illegible] Mongolia and these regions are held by an international [illegible] Unless they are to become the heritage of the Slav, China and the powers should take definite action to preserve them for the future of the yellow race. Any reasonable financial concession that can be made to China in addition to a guarantee of her sovereign rights is a small price to pay for an agreement that will help solve for another century the problem of the races and [illegible] peace to the peoples of the Pacific.

With such an outlet, Japan's fundamental problem is [illegible] solved and her whole policy would have to undergo a radical change. American and other capital could flow into these regions in co-operation with Chinese and Japanese under guarantees that will [illegible] confidence in the investor. The Japanese who now turn [illegible] eyes longingly towards America or Australia will be attracted [illegible] the golden opportunities awaiting them in these new lands [illegible]

is safe to say that once this door is opened to their activities, they will take every advantage of it and the West will hear less and less about racial equality and demands for the right of entrance into their lands.

Anti-Japanese critics, especially those who deny the existence of Japan's need for expansion, will continue to harp on the theme that the Japanese will not go into Manchuria, that they have refrained to date from settling on the farming lands comprised with the railway zone, that they cannot compete with the native, and a number of other thread-bare arguments. Much of this is true, but there has never been any real incentive for them to go into Manchuria in large numbers. The door to real opportunity has been closed. In the same way the door to real international co-operation in these regions has been closed through the operation of Chinese laws, official obstruction and graft.

In discussing the subject of possible international or American co-operation with Japan in the development of Manchuria with one of the foremost financiers of Japan last month, he became most pessimistic, citing as a reason for this attitude, the following typical incident. Not long ago some Chinese and Japanese capitalists combined with Americans for the development of a large mining property located outside the railway zone in Manchuria. Everything worked harmoniously and great hopes and expectations were entertained of establishing a typical Sino-Japanese-American co-operative enterprise on a large scale, until the project came before the Chinese authorities. What with procrastination, obstruction, demands for bribes and other annoyances on the part of the Chinese, the Americans interested finally withdrew and the scheme had to be abandoned. As long as such conditions are permitted to exist, Sino-Japanese or Sino-foreign co-operation or co-prosperity in the development of these regions is an idle dream.

These regions are therefore for all intents and purposes closed to development by the attitude of China who calmly invites a world conflagration rather than contribute her share towards its extinguishment. Is this condition to be perpetuated? With an anarchic and impotent China inviting world catastrophe before them, can the powers continue to remain in their passive rôle of disinterested spectators? If Minister Schurman's Peking speech meant anything at all, it conveyed the hope that this was too vast a menace to the peace of the world, the remedy for which is international development of these regions, not for the sake of humiliating or despoiling China, but to give effect to an aggressive friendship guaranteeing her sovereign rights by bringing order out of chaos.

The argument will be advanced that any such solution will tend in time to cement Japan's hold upon China, and make possible a consolidation of the yellow race under her leadership and so invite world disaster. The only answer to this, is fiddlesticks! With the limitation of naval armaments, any rise to power of the yellow races will be felt in Asia, and here they will be maintained in check by a nation of 200,000,000 Slavs, who can be depended upon to defend themselves against any attempt on the part of the yellow peoples to crowd them out. On the other hand, with a limitation of naval armaments, China and Japan will always be vulnerable from the sea. A combination of the navies of Great Britain, France and America will serve as sufficient guarantee that the power of China and Japan will not be permitted to develop into a world peril.

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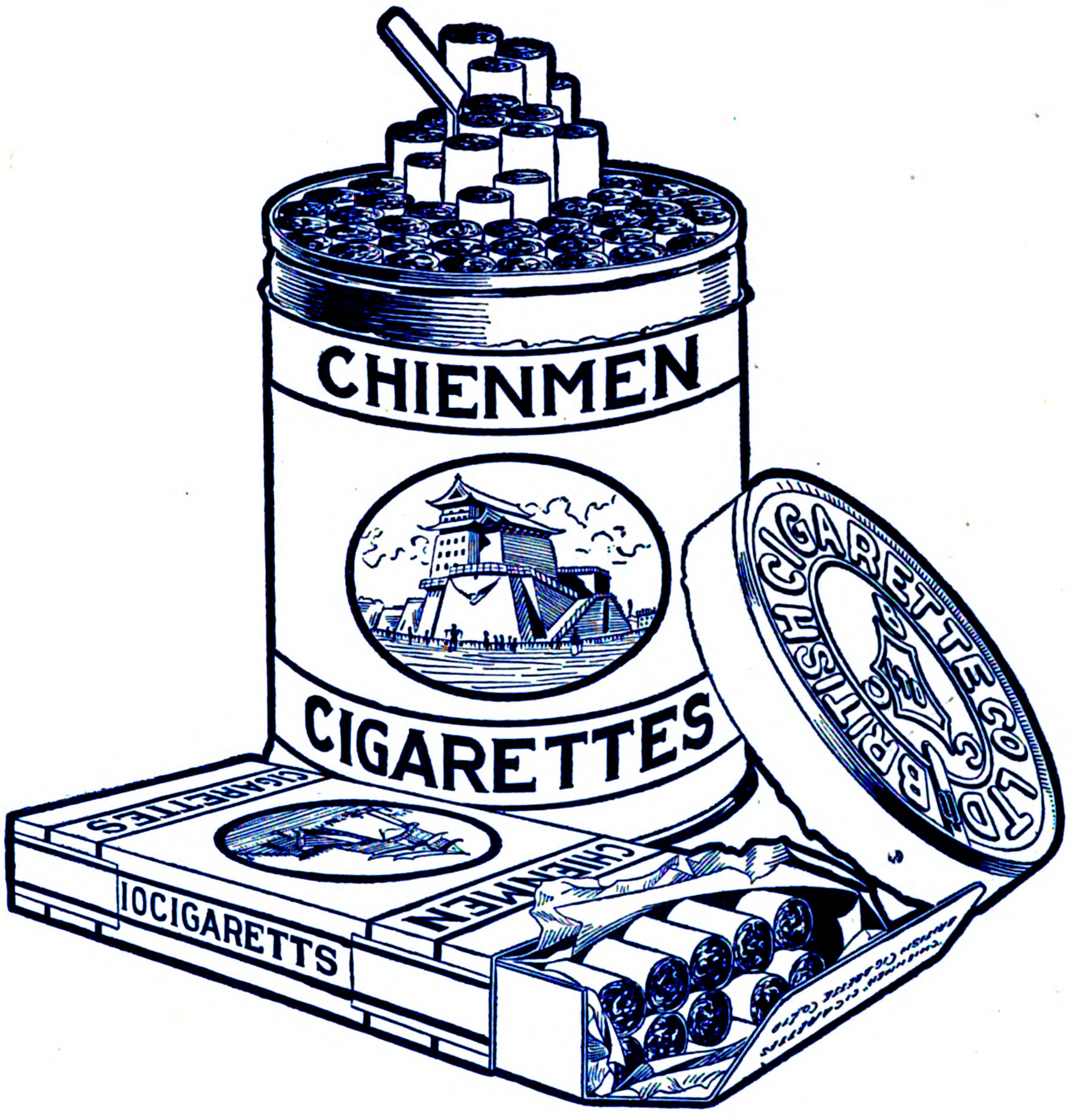

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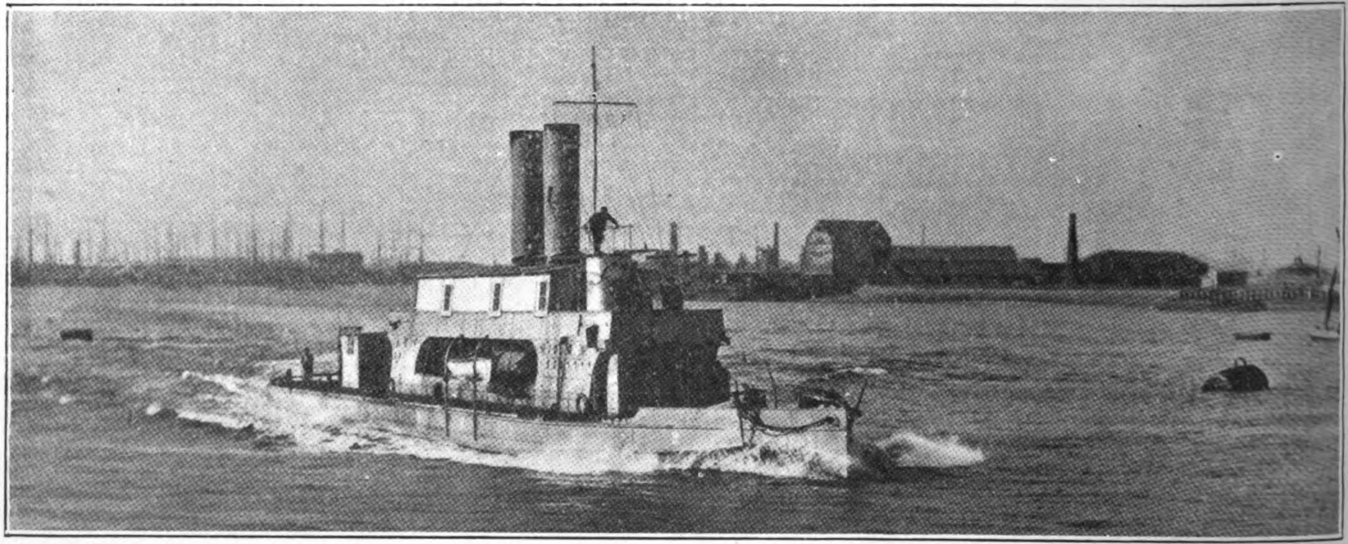

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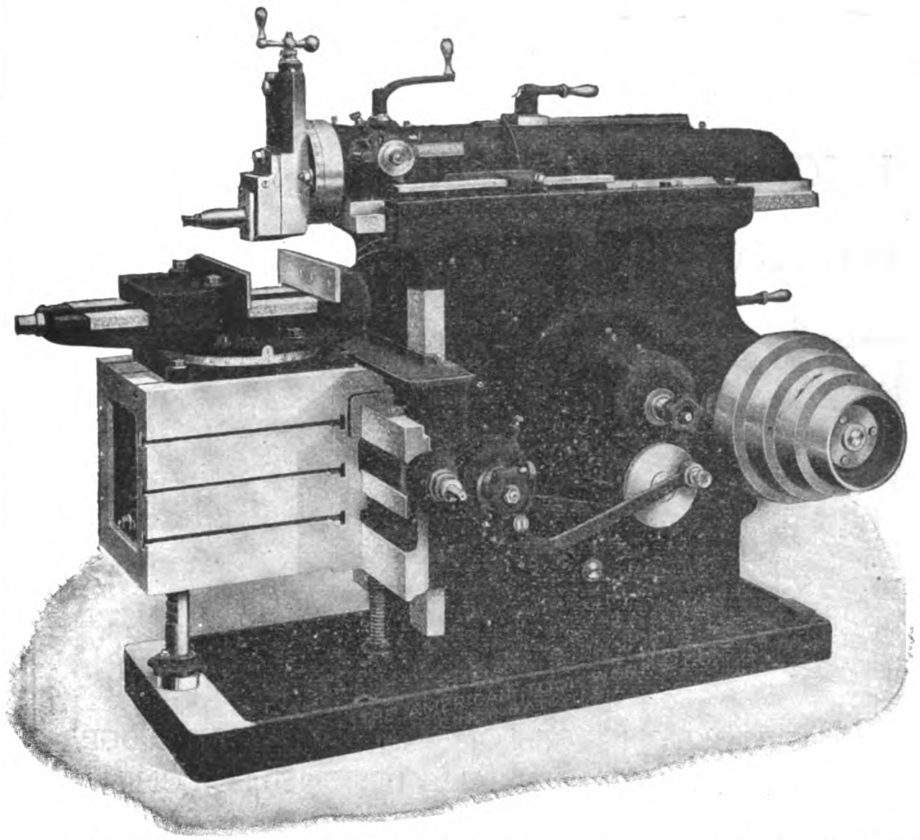

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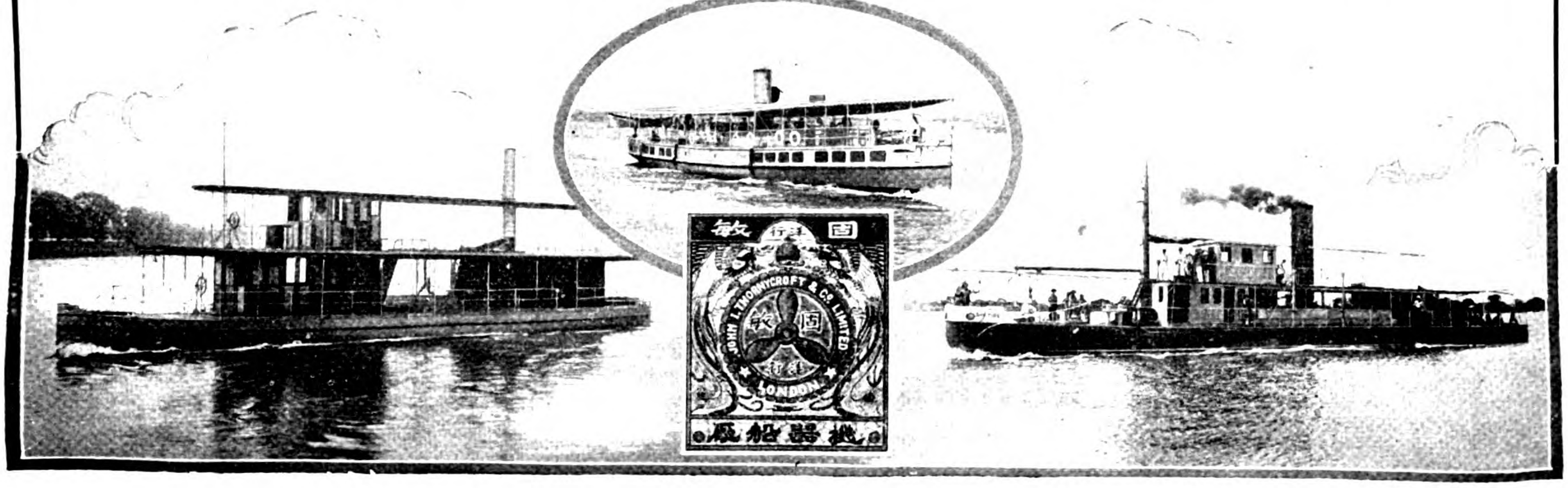

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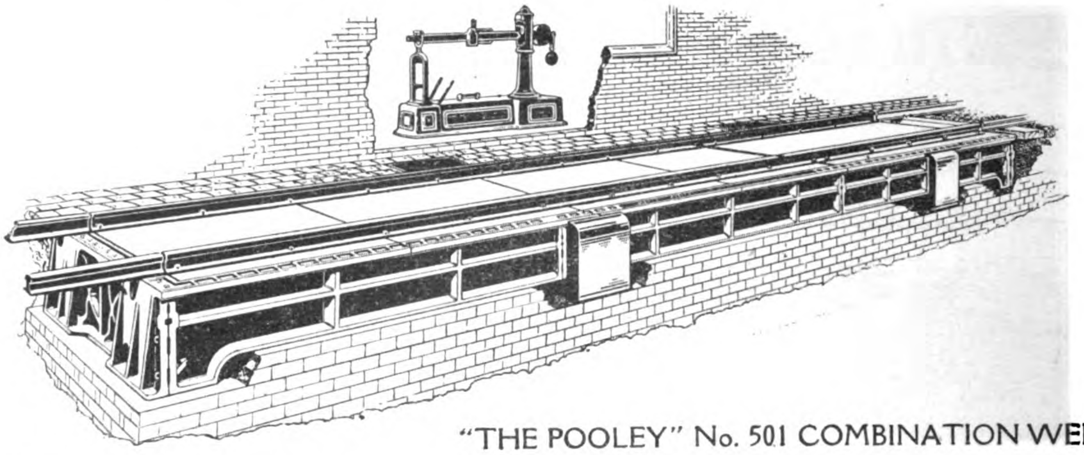

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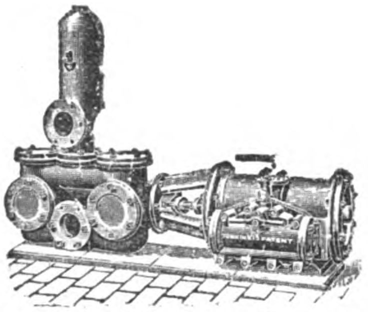

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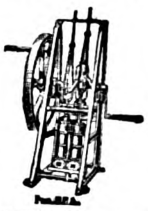

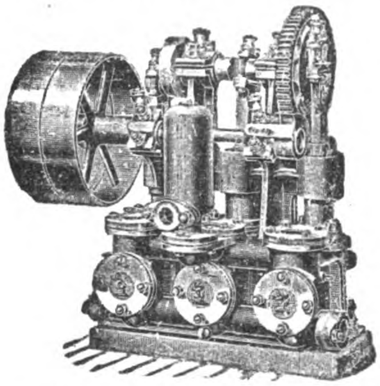

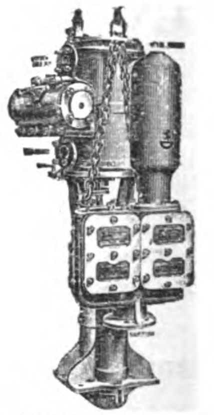

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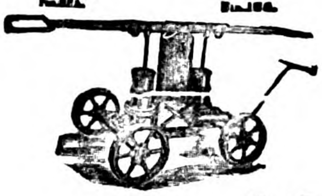

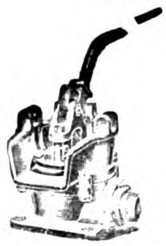

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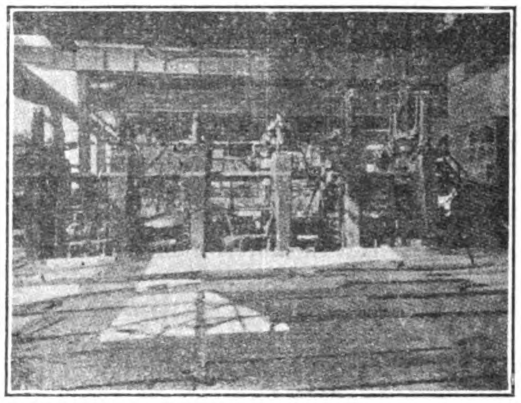

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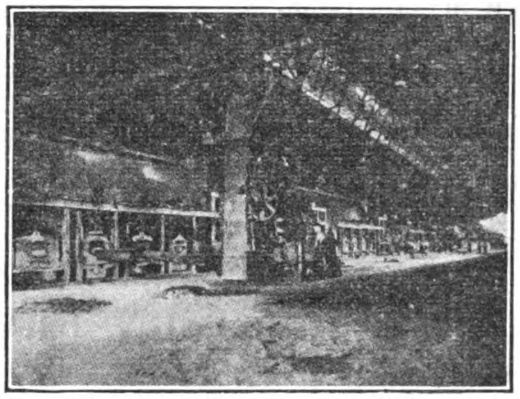

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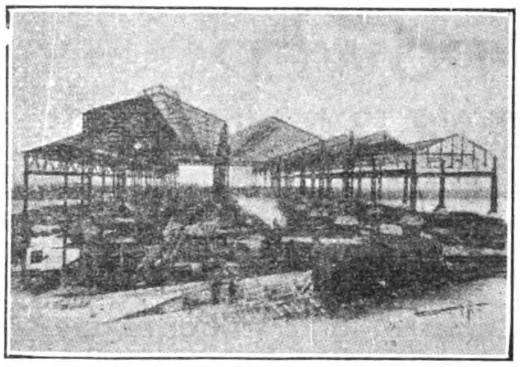

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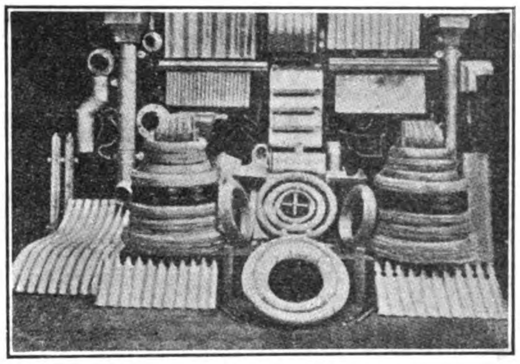

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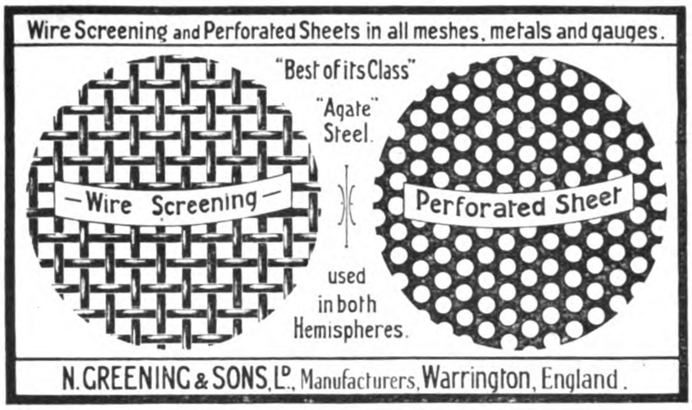

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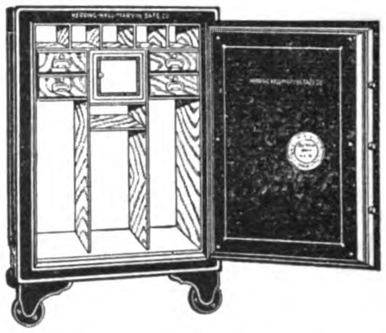

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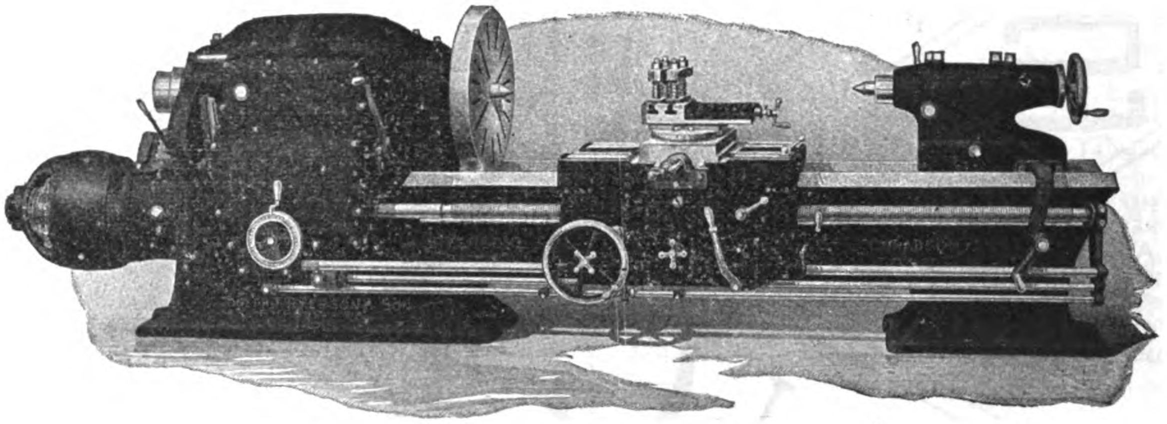

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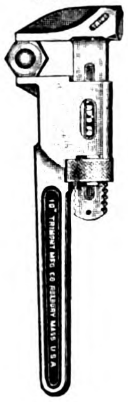

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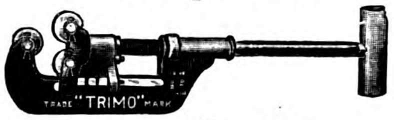

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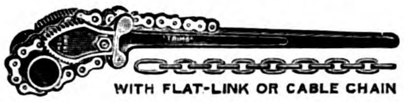

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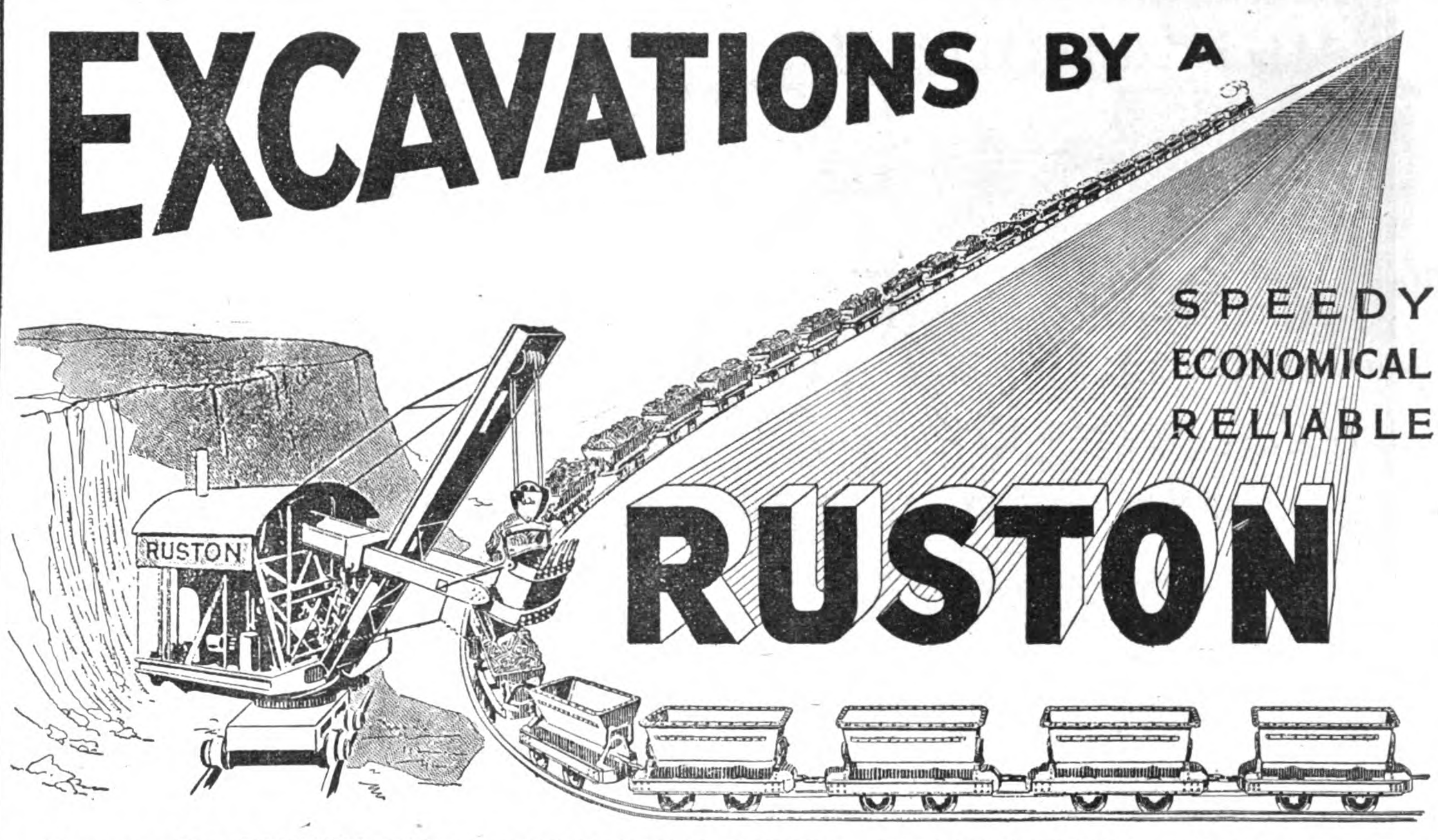

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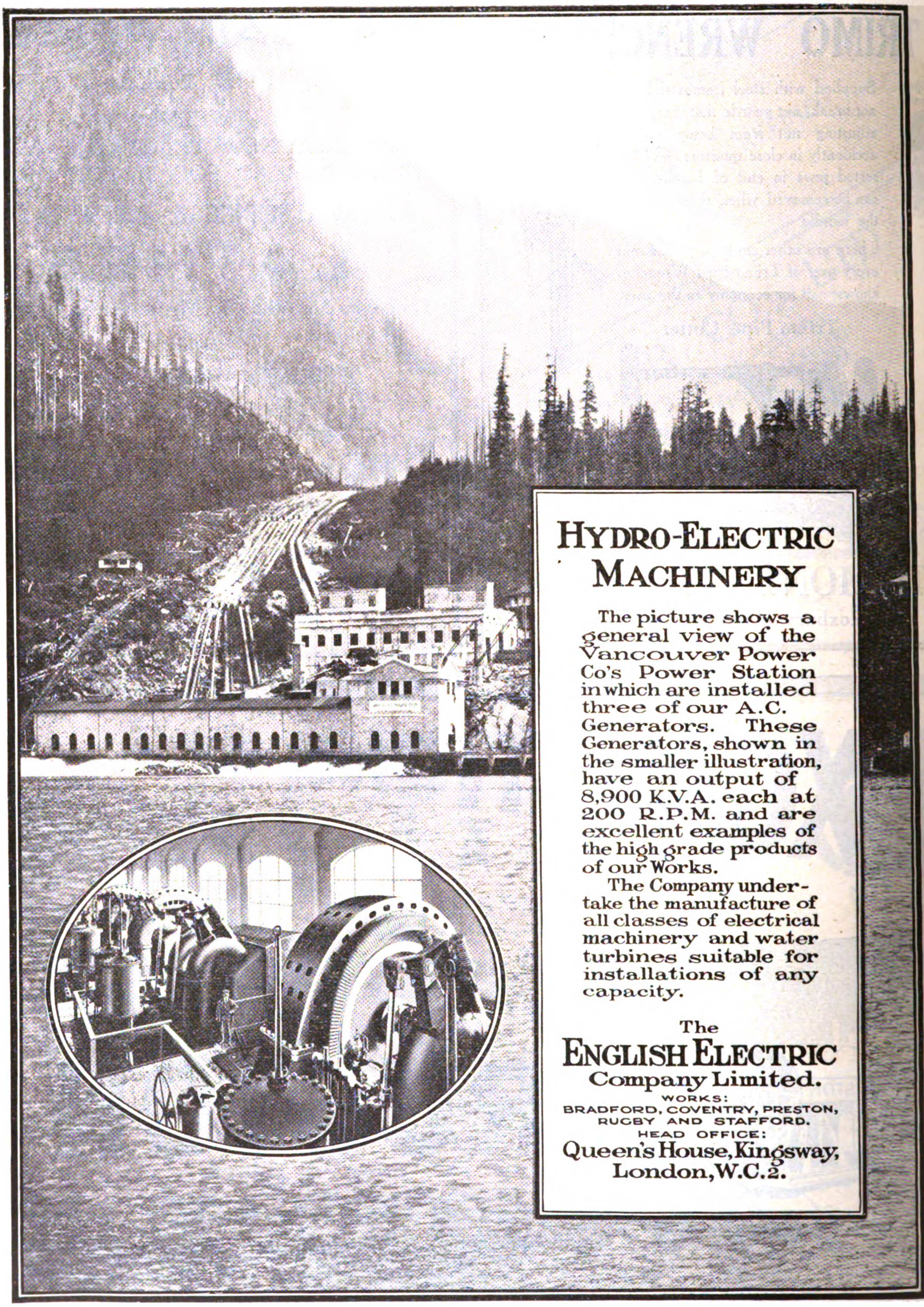

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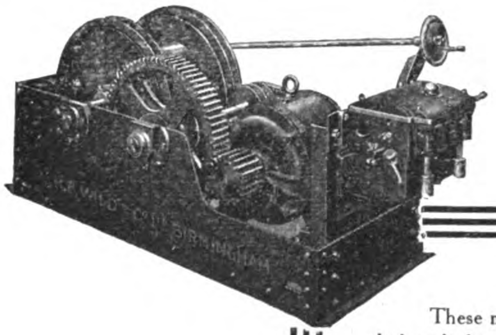

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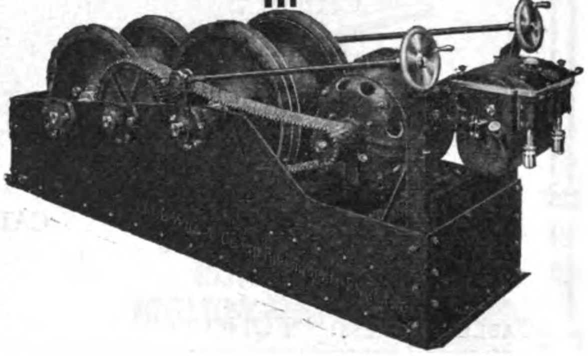

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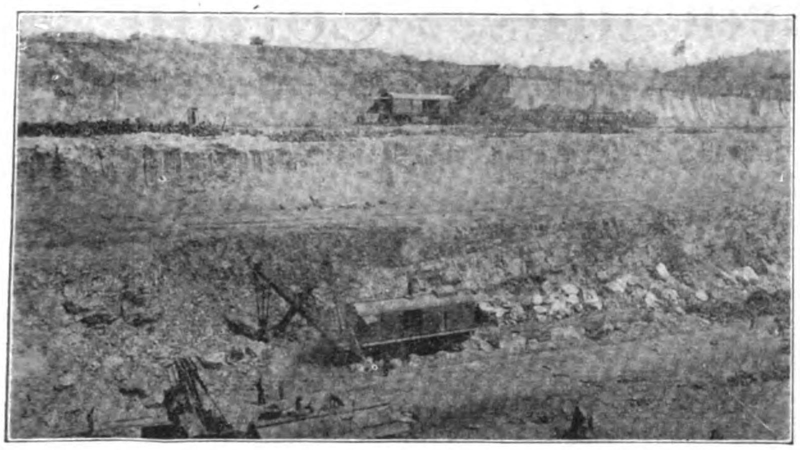

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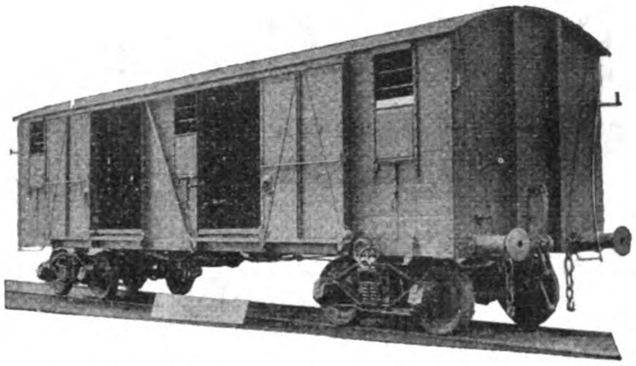

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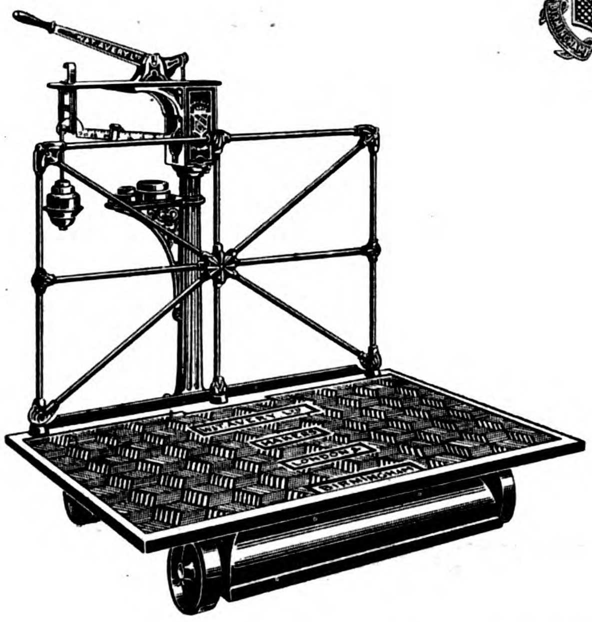

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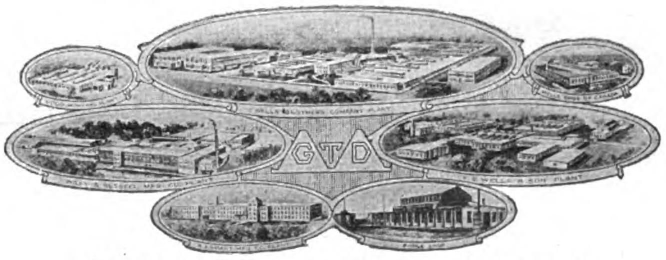

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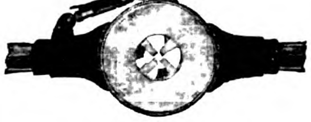

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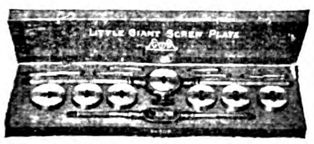

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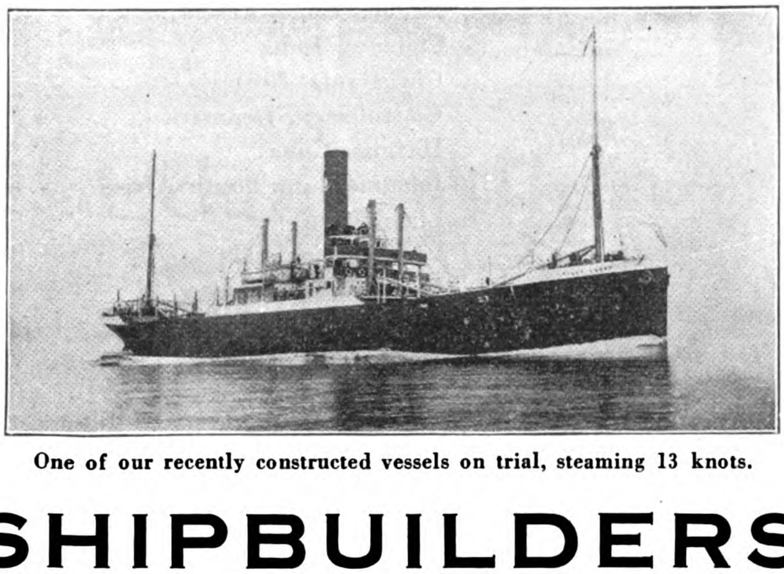

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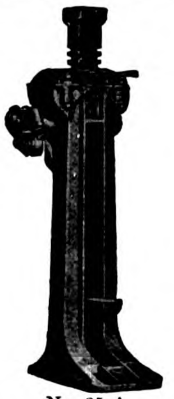

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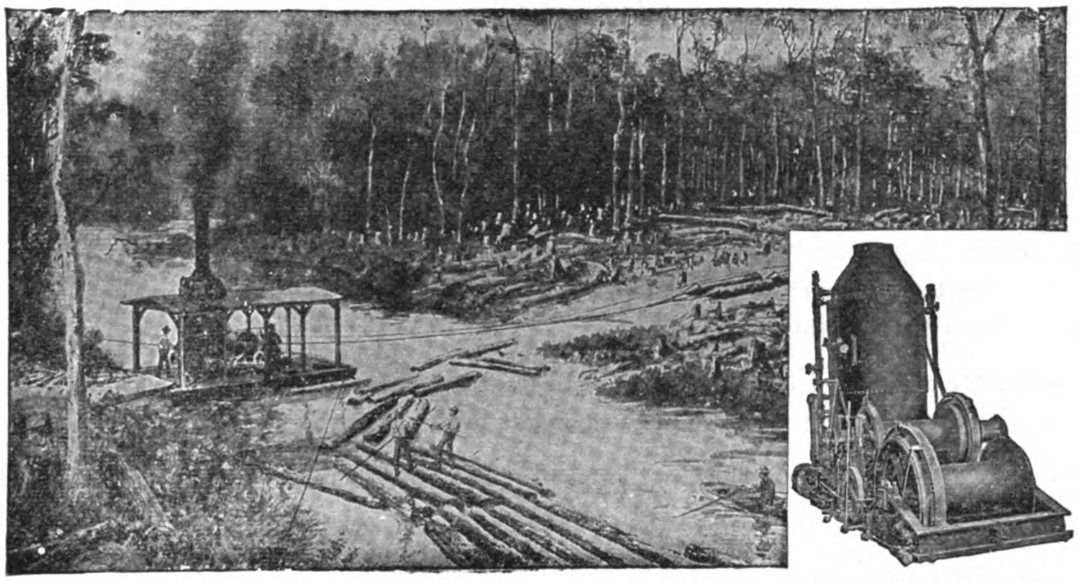

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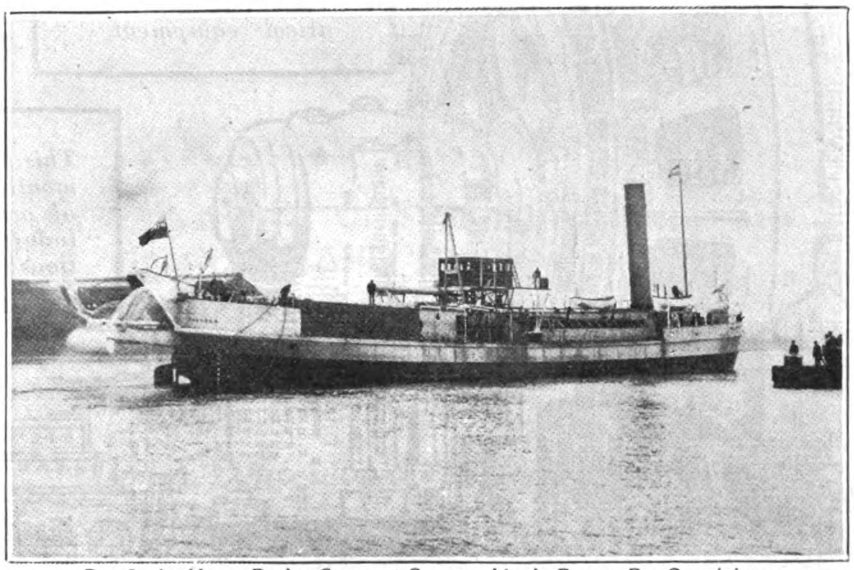

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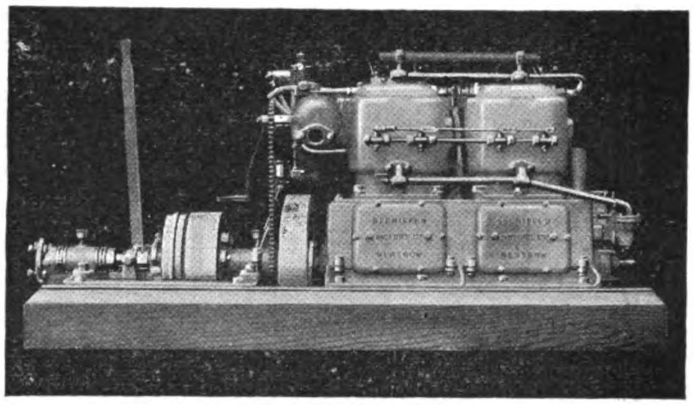

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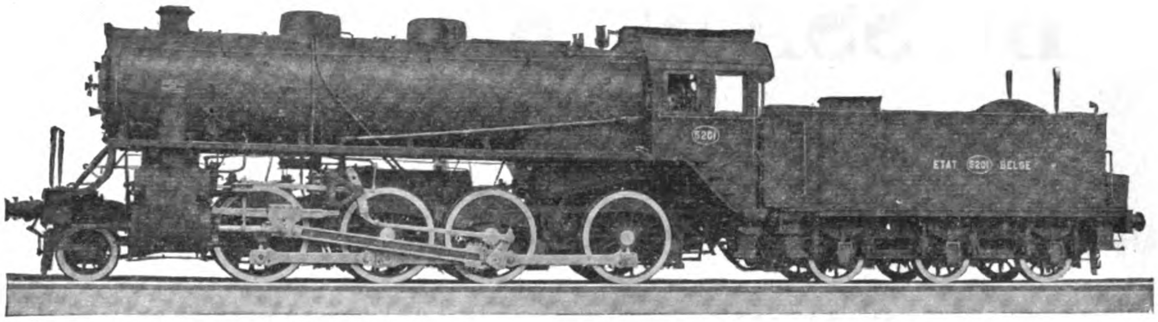

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ABROAD—London, Marseilles, Lyon, Hamburg, New York, San Francisco, Seattle, Portland, Ore, Buenos-Aires, Manila, Bombay, Karachi, Calcutta, Singapore, Bangkok, Rangoon, Soerabaya, Batavia, Semarang, Sydney, Melbourne, Hongkong, Canton, Amoy, Foochow, Shanghai, Chefoo, Hankow, Changsha, Newchwang, Tientsin, Dairen, Antunghsien, Mukden, Tieling, Chungchun, Vladivostok, Harbin, Seoul, Chemulpo, Fusan, etc., etc.

SHIPBUILDERS, ENGINEERS AND REPAIRERS SHIPYARDS AND DRYDOCKS AT TAMA, OKAYMA, JAPAN, For Construction and Repairing

PRINCIPAL LINES OF BUSINESS:

EXPORT.

Raw Silk and Silk Textiles, Coal, Lumber, Rice, Seeds, Beans, Flour, and Other Cereals, Sugar, Copper and other Metals, Vegetable and Wood Oils, Camphor, Matches, Fertilizers, Paper, Canned Foods, Fish Products, Tea, Sulphur, Cement, etc., etc.

IMPORT.

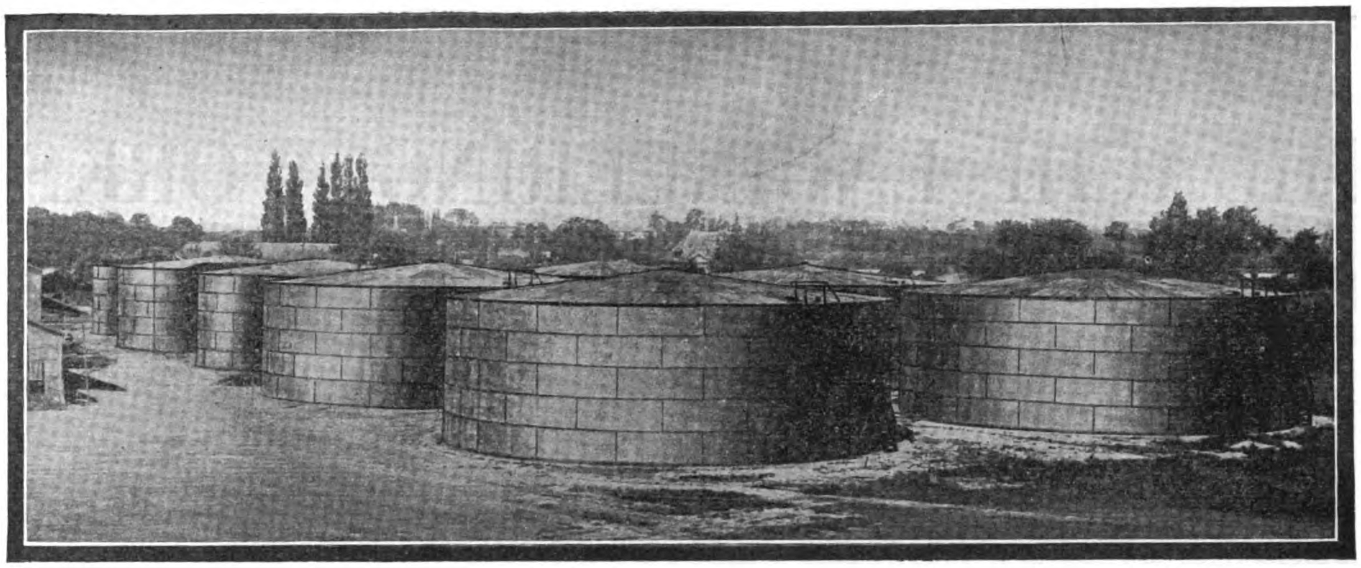
Machinery and Tools, Ships, Steel and Iron, Locomotives, Rails and other R. R. Equipment, Sugar, Rice, Wool, Phosphate, Sulphate of Ammonia, Nitrate of Soda, Rubber, Dyes, Drugs and Chemicals, Jute and Gunnies, Flax and Hemp, Wheat, Seeds, and other Cereals, Bean Cakes, Lumber, etc., etc.

ENGINEERING DEPARTMENT

Sole Agents for Leading American and European Makers, including

American Locomotive Co.
Bucyrus Co.
California National Supply Co.
De La Vergne Machine Co.
General Electric Co.
General Motors Export Co.
Manning Maxwell & Moore, Inc.
Mesta Machine Co.
Nordberg Manufacturing Co.
Sullivan Machinery Co.
Belliss & Morcom, Ltd.
Geo. Cradock & Co., Ltd.
Platt Brothers & Co., Ltd.
Ruston & Hornsby, Ltd., etc. etc.

Also, AGENTS IN JAPAN, ORIENT, and INDIA for Well-known Japanese Insurance Cos.



McClintic Marshall tanks used by G. M. Terracini, La Milleraye, France.

It is false economy to purchase structural steelwork upon a price basis only. Investigate thoroughly the experience and scope of the manufacturer.

The more carefully you analyze, the more impressed you will be with the ability of the McClintic-Marshall organization. It is the result of more than twenty years' experience in designing, manufacturing and erecting steel structures of all kinds.

We Design, Manufacture and Erect
Steel Industrial Plants
Railroad and Highway Bridges
Lock Gates
Blast Furnace Plants
Steel Storage Tanks
Riveted Steel Pipe
Steel Transmission Towers
Steel Ships and Barges
Oil Refining Plants
Gas Plants and Gas Holders
Ore Bridges
Etc.
McClintic-Marshall
Annual Capacity, 400,000 Tons

Write for free booklet No. 403

McClintic-Marshall Products Company

FACTORIES: PITTSBURGH, U. S. A.
Foreign Contract Dept: 50 Church Street, NEW YORK, U. S. A.
LONDON: 25 Victoria Street, S.W.1.
PARIS: Produits Métallurgiques McClintic-Marshall, 8 Rue Edouard VII
MADRID: Hispano-American Corporation.
YOKOHAMA: H. E. Root, 50a Yamashita-cho 4.
HAVANA: San Ignacio y Obrapia

Cable Address: "Macmarsh" NEW YORK.
Codes: Bentley's
General
Western Union Five Letter
Lieber Five Letter

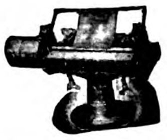
McClintic-Marshall
Steel Construction

FROM THE TIN PLATE TO THE FINISHED CAN

The Double Seamer

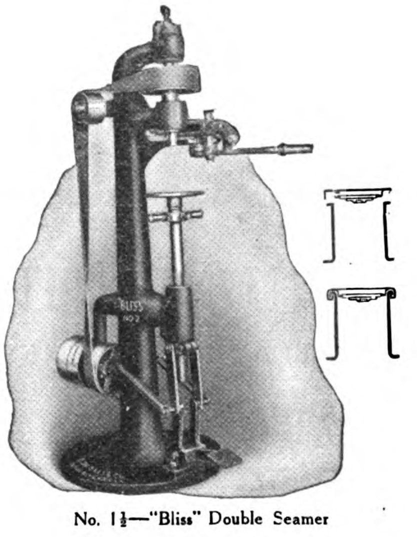
SHEAR
This cuts the tin plate into strips.

PRESS
This blanks out tops and bottoms.



ROLL FORMER
This rolls the bodies to cylindrical shape.

SOLDERING FRAME and CYLINDER
This solders the side seams.



No. 1½—"Bliss" Double Seamer

After the tops and bottoms of the cans have been stamped out and the finished bodies properly flanged, the material is ready for the final process of double seaming the bottoms and tops on the bodies (see machine and operation at left). First the rubber ring is attached or the lining compound applied; then the "BLISS" DOUBLE SEAMER attaches the bottom of the can to the body. After this, the can is filled and the top attached in like manner. This completes the process and the filled can is ready for labeling or shipping.

This completes the series of operations for making finished cans from the tin plate. You will do well to assemble and reread this series of seven advertisements. You will then know just what machines you will need for your purpose.

"Bliss" Can Making Machinery (one series shown at right) is suitable for making cans of all kinds and tin packages for every purpose. With your inquiries always send samples and state daily output desired.

FLANGER
This flanges both ends of can bodies.

DOUBLE SEAMER
This attaches bottoms and tops

E. W. BLISS COMPANY

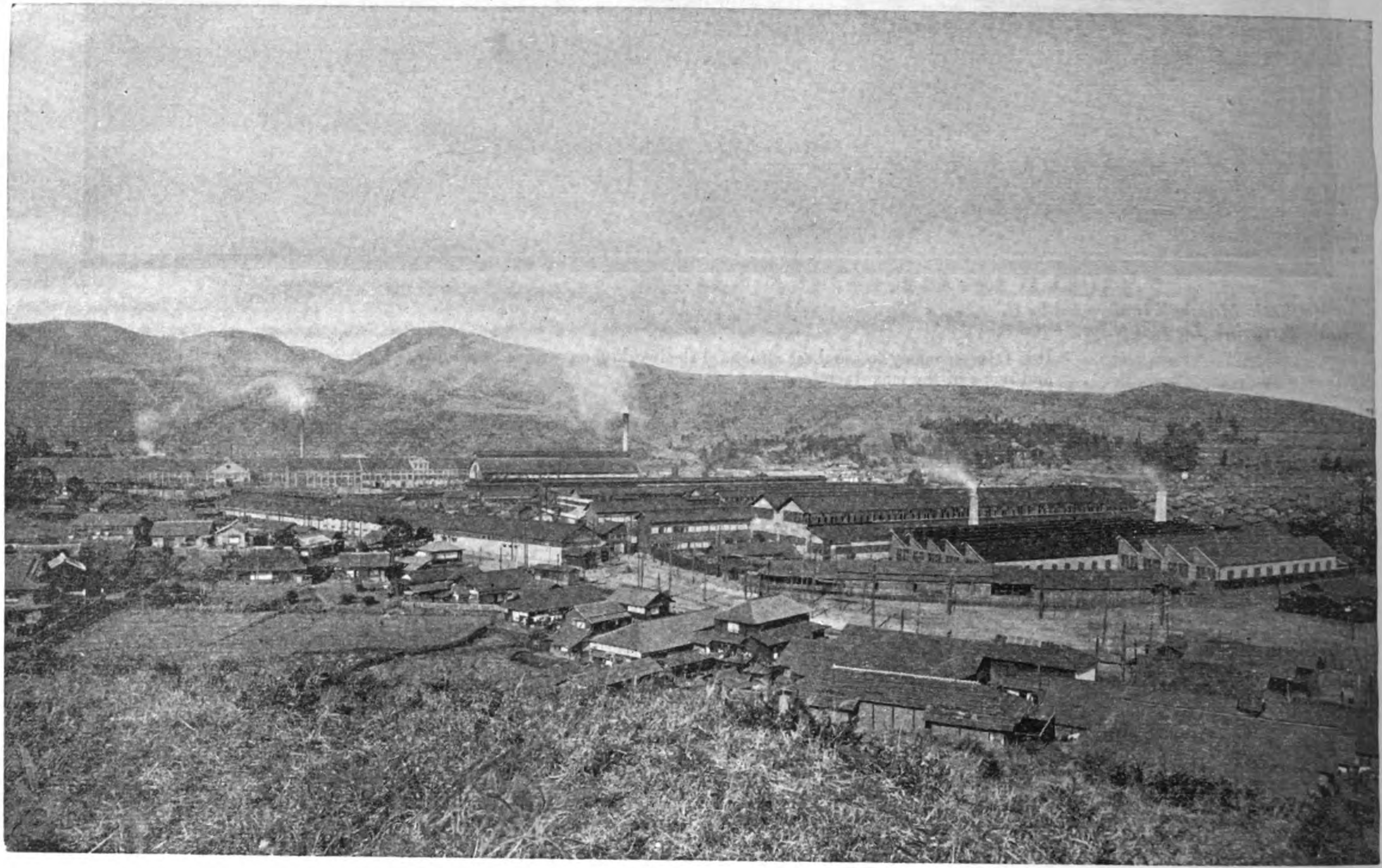
22 JOHN ST., BROOKLYN, N.Y., U.S.A.

Presses, Dies and Machinery for the Sheet Metal Industry in general. Complete plants for the manufacture of Metal Boxes, Sanitary Cans of all shapes and sizes, Kitchen Utensils, Petroleum Cans, etc. Complete automatic equipment for making tin cans from tin plate in one continuous operation.

BLISS

London, England—Pocock St., Blackfriars Road   Paris, France—100 Boulevard Victor Hugo, St. Ouen

HIDACHI ENGINEERING WORKS



GENERAL VIEW OF HIDACHI ENGINEERING WORKS

Location of Plant:

SUKEGAWA, IBARAKI PREFECTURE, JAPAN.

Sales Departments:

KUHARA MINING COMPANY OFFICES, 1 ITCHOME, YAESUCHO, KOJIMACHI-KU, TOKYO.

KUHARA MINING COMPANY OFFICES, 90 NICHOME, KITAHAMA, HIGASHI-KU, OSAKA.

Articles Manufactured:

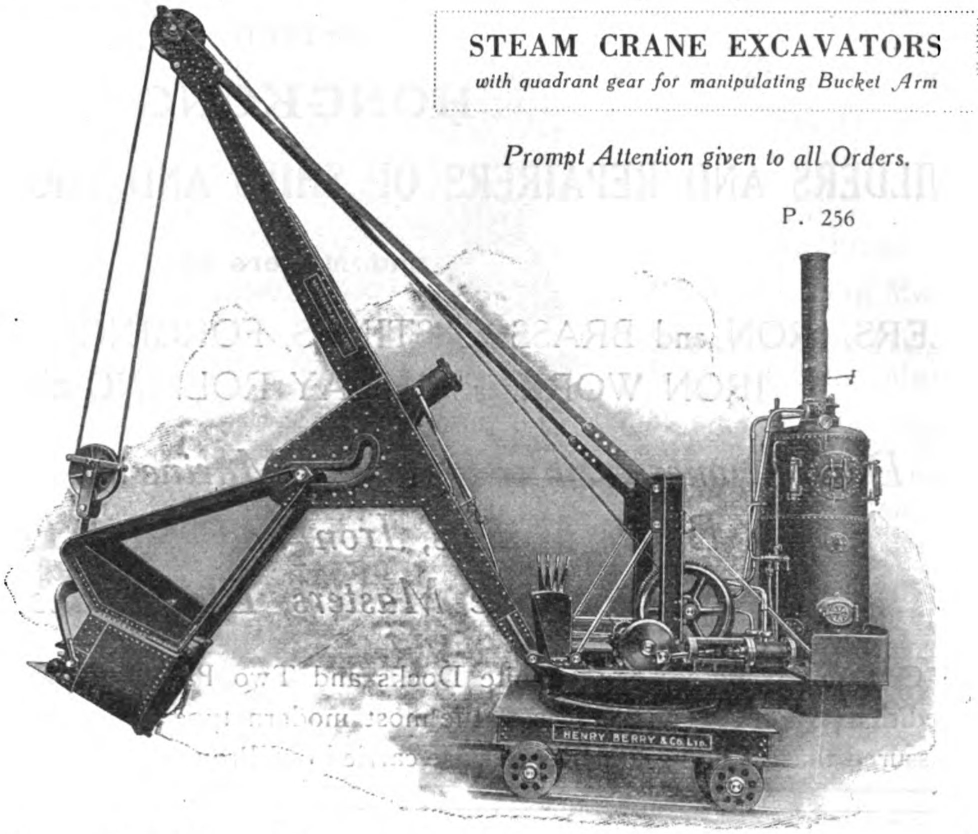
DYNAMOS, ELECTRIC MOTORS, TRANSFORMERS, DISTRIBUTOR PLATES, TURBINE PUMPS, CRANES, WINCHES, AND VARIOUS KINDS OF HYDRAULIC WHEELS.

Also Agents for Hoden Oil, Used for Transformers.

STEAM CRANE EXCAVATORS
with quadrant gear for manipulating Bucket Arm

Prompt Attention given to all Orders.

P. 256



Quick Work

This is one of the Berry

8-TON

Steam Driven EXCAVATORS

with a working output per ten hour day of 420 cubic yards in hard clay or 850 in sand. Invaluable for every kind of Mining, Canal and Railway Building Work.

We also supply Shipyards, Boilermakers and Steel Works with Plant of all Kinds.

London Office: **38 Victoria Street, Westminster, S.W. 1.**
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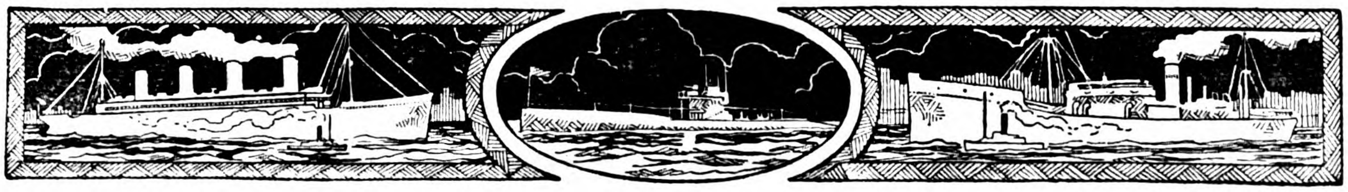
HENRY BERRY & Company Limited.

HYDRAULIC ENGINEERING SPECIALISTS

Codes: A. 1. 5th Edition A.B.C. Engineering

LEEDS, ENGLAND

Codes: Everybody's Pocket Code Marconi International



THE
HONGKONG & WHAMPOA DOCK CO.
LIMITED,

HONGKONG

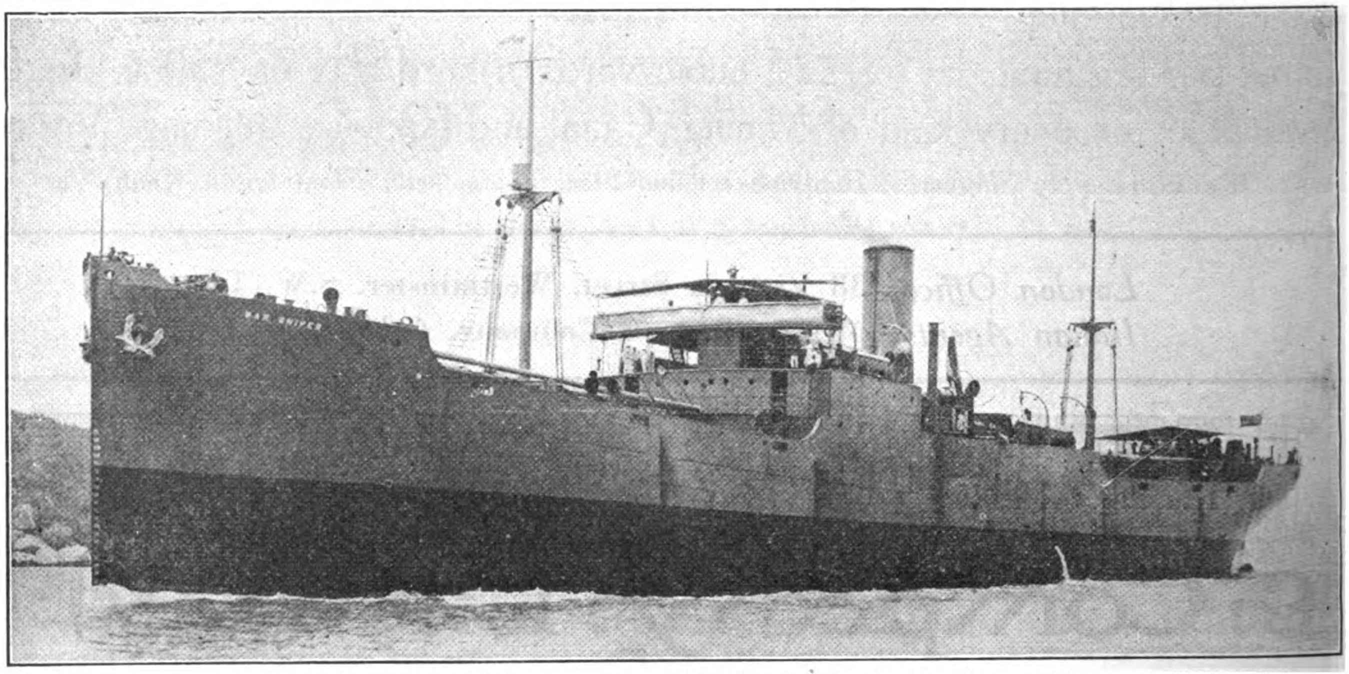
BUILDERS AND REPAIRERS OF SHIPS AND ENGINES OF ALL KINDS

and Makers of

BOILERS, IRON and BRASS CASTINGS, FORGINGS and CONSTRUCTIONAL IRON WORK, RAILWAY ROLLING STOCK, Etc.

Dock Owners, Ship Builders, Marine and Land Engineers, Boiler Makers, Iron and Brass Founders, Forge Masters, Electricians

The Company possesses Six Granite Docks and Two Patent Slipways and these are Equipped for Expeditious Work. The Plant is of the most modern type throughout. Ship Owners and Captains are assured that Docking and Repairs are carried out Promptly and at Moderate Charges.



S.S. "*WAR SNIPER*," 8,200 tons d.w.—5,175 tons gross. Built and engined by The Hongkong & Whampoa Dock Co., Ltd. to the order of the British Government.

Address Enquiries to the Chief Manager, R. M. DYER, B.Sc., M.I.N.A., Kowloon Docks, Hongkong

HEAD OFFICE: KOWLOON
TELEPHONE No. 55 K.

TOWN OFFICE: QUEEN'S BUILDINGS
TELEPHONE No. 20 HONGKONG

TELEGRAPHIC ADDRESS: "MANIFESTO" HONGKONG

Codes Used: A1; A.B.C., Fifth Edition; Engineering, First and Second Editions; Western Union and Watkins

MACHINE TOOLS

Agents for China:—

The Anglo-Chinese Engineers' Association, Ltd. in Association with Reiss & Co.

Address:—

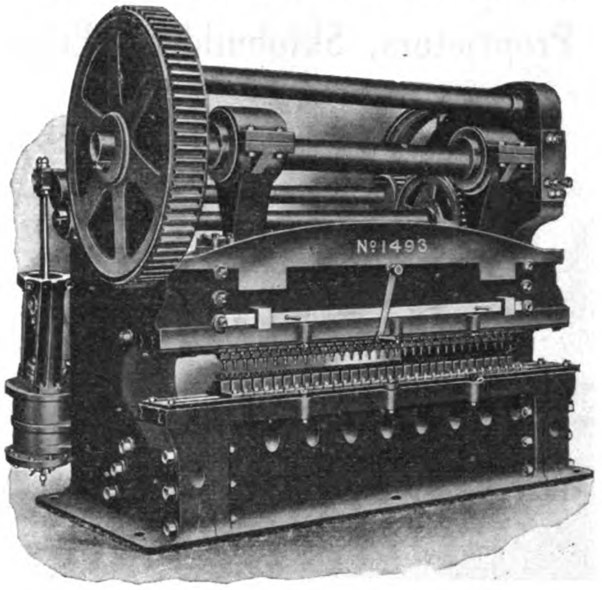
Ice House St., Hongkong

7 Hankow Rd., Shanghai

Liddell Buildings, Yaku Road, Tientsin.

52 Dar Farng Chia Hutung, Peking.

With Steel Plate or Cast Iron Frames



Multiple Punching Machine

Punching and Shearing Machines.

Plate Bending Machines.

Plate Straightening Machines.

Plate Edge Planing Machines.

Plate Shearing Machines.

Steam Bending and Straightening Machines.

Bar Cropping Machines.

Multiple Punching Machines.

etc. etc.

CRAIG & DONALD LIMITED

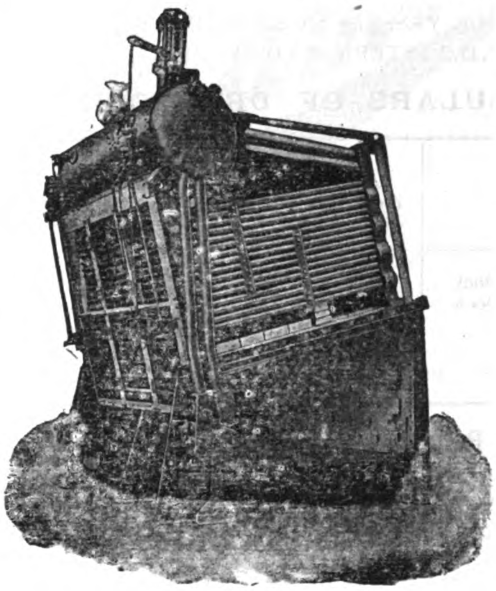
Johnstone, Nr. Glasgow, Scotland

BABCOCK & WILCOX, LTD.

PATENT

WATER-TUBE STEAM BOILERS

SUITABLE FOR ALL INDUSTRIES, AND FOR BURNING ANY KIND OF FUEL

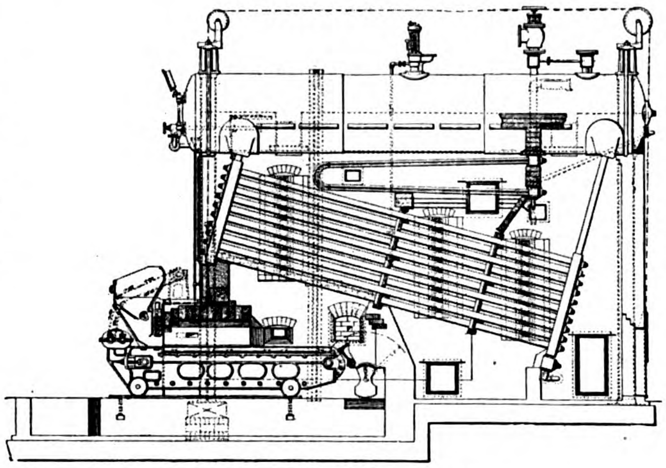


Babcock & Wilcox Marine Boiler

ADVANTAGES:

Simple in Design. Easy to Clean
Constructed of Wrought Steel. Rapid Steam Raiser
Economical in coal. Economical in Repairs
Very Durable. All Straight Tubes
No Screwed Joints. No Cast Metal
No joints exposed to the Fire
Rapid Circulation of Water
Steady Water Level
Large Steam Space
Installed in many large installations in China and Japan

13,400,000 H.P. Land-type For Stationary Purposes—**6,400,000 H.P.** Marine-type Afloat



BABCOCK & WILCOX LAND BOILER, fitted with Patent Superheater and Chain Grate Stoker

MANUFACTURERS OF

Steam Superheaters
Feed-Water Heaters
Coal Conveyors
Suction Ash Plants
Economisers
Water Softeners and Purifiers
Structural Steel Work
Mechanical Stokers
Steal Chimneys
Electric Cranes

For Burning Chinese and Japanese Coal Smokelessly
Complete Steam Piping Plants and all Boiler House Accessories.
Also White-Forster Water-Tube Marine Steam Boilers.

Head Office in China: 1 THE BUND, SHANGHAI
" " " Japan: 1 1-CHOME, YURAKU-CHO, KOJIMACHIKU, Tokyo

The Shanghai Dock and Engineering Co., Ltd.

Established 1862 **(LATE S. C. FARNHAM, BOYD & CO., LTD.)**

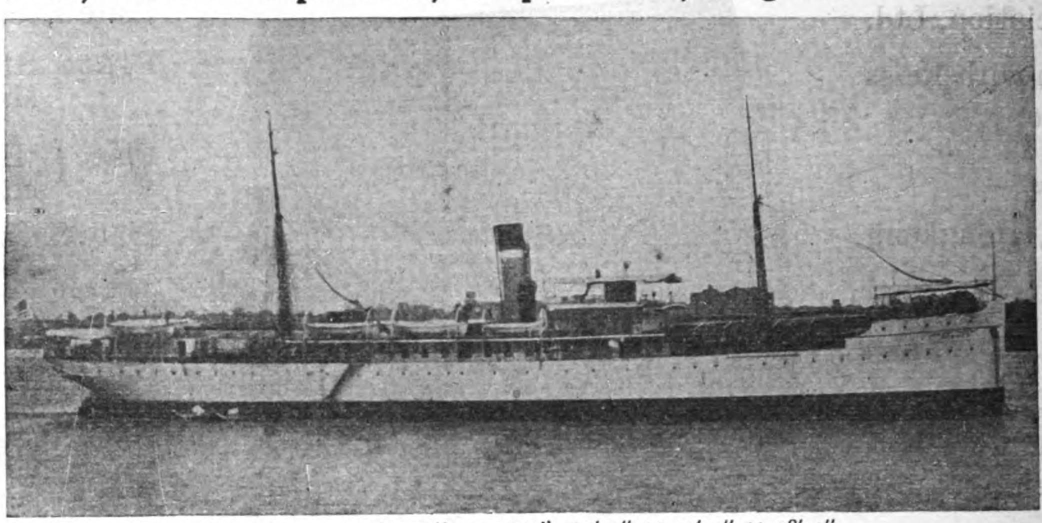
Boilermakers, Dock Proprietors, Shipbuilders, Engineers and Electricians

HEAD OFFICE:

26 Broadway,

Shanghai

Telephone No. 7



U.S. ARMY TRANSPORT "MERRITT," 300′ 0″ × 45′ 0″ × 28′ 3″

Cable Address "FARNHAM"

Codes Used, A.B.C. 4th, 5th & 6th Editions A-1, Watkin's, Scott's, Western Union, Bentley's and Engineering.

The "Merritt" is one of Twenty-Seven Steam Vessels built during the last few years to the order of The American Government for service in the Philippine Islands.

The Docks are five in number, ranging in length from 355 feet to 532 feet on the Blocks, and breadth of entrance from 53 feet to 77 feet, with a depth of water on the sill of from 16 feet to 24 feet.

The Dock charges are the most moderate in the Far East.

The Company's Yards and Docks cover 96 acres. The Water Frontage is about 1½ miles in length. Wharves and Pontoons are arranged where steamers can moor during repairs; and slips for hauling up small vessels are provided. Sheer legs capable of lifting 65 tons are placed at the various Docks.

The extensive Shipbuilding yards and workshops, lit by Electric Light, are provided with the latest improvements, such as travelling cranes of 60 tons' capacity, hydraulic and pneumatic machinery and tools.

Light railway lines are laid throughout workshops and yards.

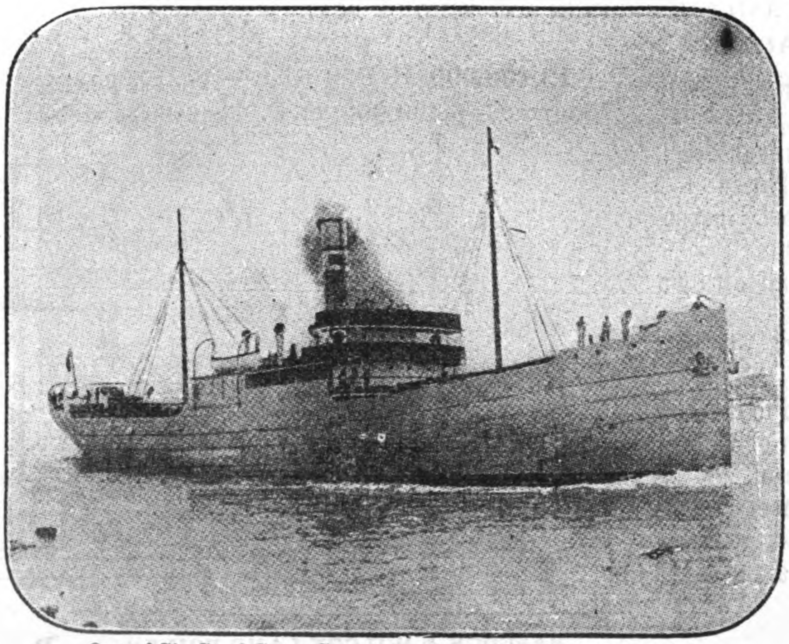
A Staff of Divers, and powerful salvage appliances, and Floating Cranes ready for any emergency at short notice. Enquiries immediately attended to.

Estimates given for all classes of work: Coast Steamers, Side and Stern Wheelers, Tugboats, Launches, Steam Barges, Dredgers, Floating Cranes, and Lighters a speciality.

Every description of repairs and renewal work undertaken and expeditiously executed.

Motor, Land and Marine Engines and Boilers, Centrifugal, Mining, and other pumping machinery always in stock or in progress, also power driven Machine Tools. Engineer's Hand Tools, Steam, Gas, Oil, and Electric machinery and Engineering accessories generally.

Low Pressure Hot Water and Steam Heating Installations



One of Six Steel Cargo Steamers presently under construction.

CALL FLAG FOR VESSELS IN SHANGHAI HARBOUR
"F.B." INTERNATIONAL CODE

PARTICULARS OF DRY DOCKS

Names	Length on Blocks	High Water	
		Breadth of Entrance	Depth of water on Sill
Cosmopolitan Dock ...	532 feet	77 feet	24 feet
International Dock ...	528 ,,	77 ,,	23 ,,
New Dock	450 ,,	74 ,,	21 ,,
Old Dock	399 ,,	53 ,,	16 ,,
Tunkadoo Dock ...	350 ,,	67 ,,	16 ,,

Berths for Building Steamers up to 10,000 tons Deadweight Capacity.

Representatives and workmen attend vessels at Woosung and outports on request.

☛ Telegraphic and Wireless Instructions from vessels promptly attended to

ENQUIRIES SOLICITED

WILLIAMS' SUPERIOR
Drop-Forged
"BULL DOG" WRENCHES
For Rounds—Squares—Hexagons
In fact, any and every shape
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Export Office: 124 State Street, New York, U.S.A.

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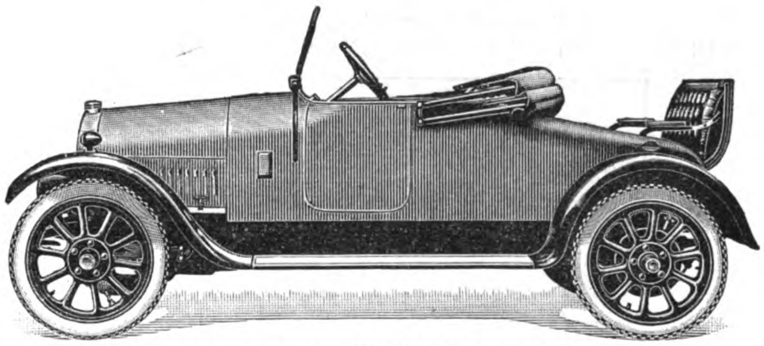
Humber

The First Consideration

NOW more then ever the choice of a new car turns largely upon the questions of first cost and economy of upkeep. In these respects a HUMBER may challenge comparison, for in view of the exceptional quality of materials used and the studied perfection of every detail of construction, the first cost of a Humber model is undoubtedly reasonable; while the testimony of Humber owners is unanimous as to the low cost of upkeep. Convincing proof of this can be supplied to any intending purchaser who will write for illustrations of the latest 10 H.P. and 15.9 H.P. models.

Full particulars on request

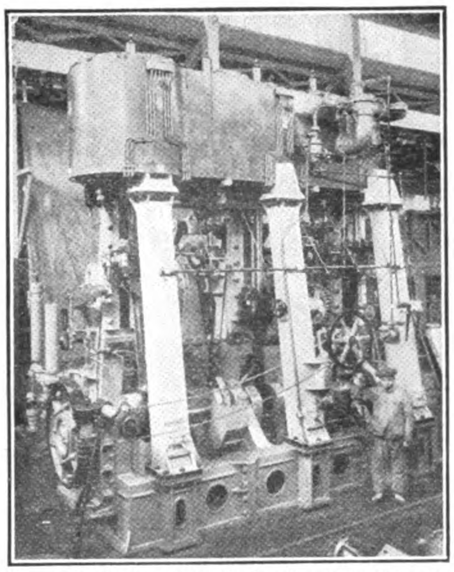


10 h.p. Four-Seater (R.A.C. Rating, 11.4 h.p.)

HUMBER LIMITED
WORKS
COVENTRY, ENGLAND

THE NEW ENGINEERING & SHIPBUILDING WORKS LTD.

SHANGHAI, CHINA Cable Address: "SPEEDY"



Set of Triple Expansion Engines for Cargo Steamer

ENGINEERS, BOILERMAKERS, ELECTRICIANS, FOUNDERS, WELDERS, SALVAGE EXPERTS

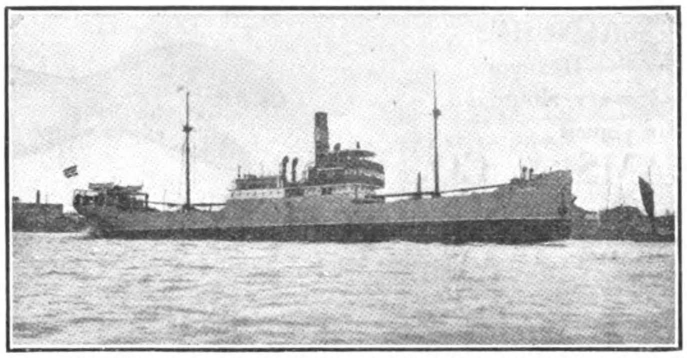
COMPOUND AND TRIPLE EXPANSION ENGINES for marine and stationary purposes.

MARINE MOTOR ENGINES for Petrol, Gasolene, Kerosene or Paraffin.

CONDENSING PLANTS, PUMPS, HOISTING ENGINES, etc.

STEEL STRUCTURAL WORK, BRIDGE GIRDERS AND ROOF TRUSSES

CYLINDRICAL MULTITUBULAR BOILERS, CORNISH and LANCASHIRE BOILERS, VERTICAL BOILERS.



S.S. "Halvdan," one of 8 Steamers Built and Engined at Works

SHIPBUILDERS

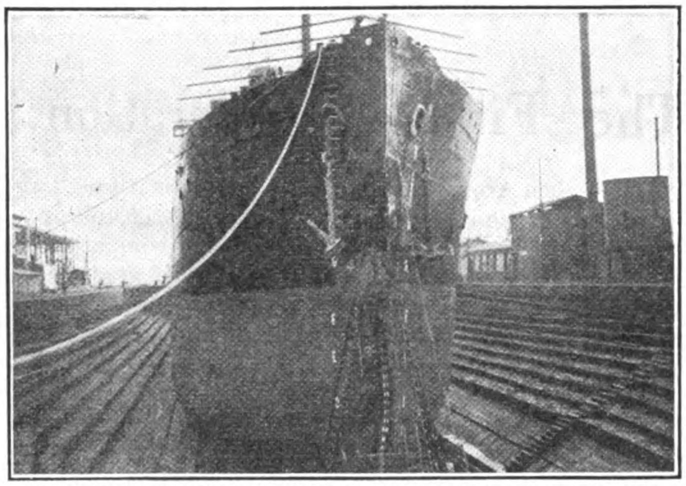
Ocean and River Craft Oil Carriers

Auxiliary Schooners

Shallow Draft Passenger and Cargo Vessels

Steam or Motor Driven

Steel, Wood or Composite built.



7,000-ton Steamer Docked for Repairs of Damage Sustained in Collision

DOCK PROPRIETORS

Yangtszepoo Dock

Length	577′-0″
Entrance	70′-0″
Width of Sill	60′-0″
Depth on Sill	20′-0″

Patent Slips

for vessels up to 200-ft. long

Vessels docked promptly

General Repairs, Annual Overhauls and Re-classification Work executed efficiently and expeditiously under European Supervision.

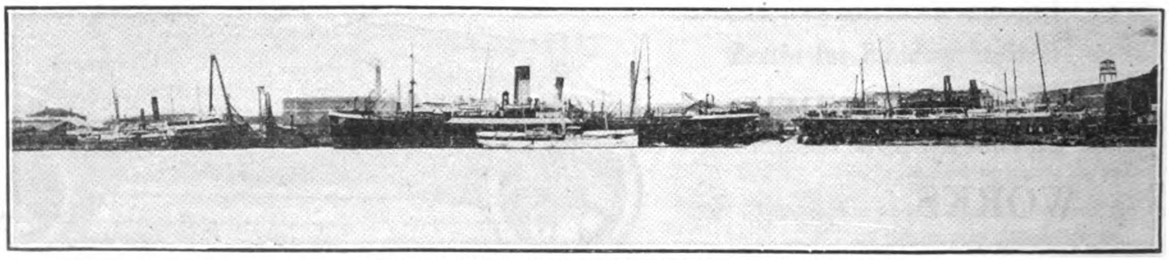
Moderate Charges

Vessels undergoing repairs accommodated at wharves alongside Works.

The Works are equipped with the latest Machine Tools, Electric Drills, Pneumatic and Hydraulic Plant and Tools, Quasi-Arc Electric Welding and Oxy-Acetylene Welding, Galvanizing Plant.

Salvage Experts, Divers and a comprehensive Salvage Plant. Floating Cranes to lift 50 tons and Sheerlegs to lift 80 tons.

THE PROPERTY OF THE COMPANY COVERS AN AREA OF ABOUT 40 ACRES with a RIVER FRONTAGE of 1,800-ft.



General View of Works from River Side
Showing 8 Steamers Berthed Alongside Undergoing Repairs.

Cable Address :
"DOCKYARD" KOBE
"DOCK" DAIREN

A1, A.B.C. (4th and 5th),
Engineering, Scott's, Lieber's
Bentley's
and
Western Union Codes Used

KAWASAKI DOCKYARD CO.,
LIMITED

CONTRACTORS TO THE IMPERIAL JAPANESE ARMY AND NAVY AND TO FOREIGN GOVERNMENTS

KOBE

ESTABLISHED 1870

STEEL MAKERS, SHIP-OWNERS, LOCOMOTIVE BUILDERS, SHIPBUILDERS, ENGINEERS AND REPAIRERS

BRANCHES:

DAIREN, N.-C.,
Dockyard & Engineering
Works

HYOGO, KOBE
Steel Foundry, Bar Mill and
Railway Shops

FUKIAI, KOBE
Plate Mill

BUILDERS OF

BATTLESHIPS, CRUISERS, TORPEDO-BOATS, DESTROYERS, SUBMARINES

ALSO, BUILDERS OF

FIRST-CLASS HIGH-SPEED OCEAN STEAMERS OF THE LARGEST SIZE AND POWER

THE URAGA DOCK CO.,

LIMITED

CONTRACTORS TO THE IMPERIAL JAPANESE ARMY, NAVY AND FOREIGN GOVERNMENTS

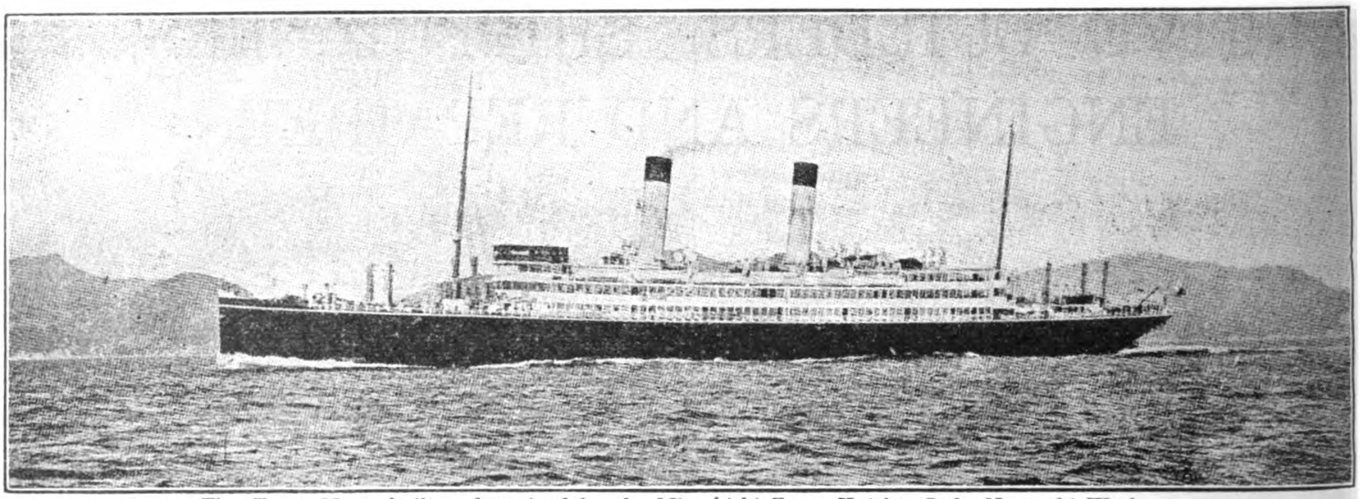
SHIPBUILDERS, ENGINEERS, BOILERMAKERS AND REPAIRERS

Head Office and Dockyard: URAGA, JAPAN
Branches: TOKYO, YOKOHAMA, YOKOSUKA

Specializing in

CARGO BOATS
MIYABARA'S PATENT WATER TUBE BOILERS
DREDGES OF ALL KINDS
TSUTSUMI'S PATENT DOUBLE ACTING AIR PUMPS

DRY DOCKS: No. 1, 500-ft. long; 70-ft. wide; 35-ft. deep.
No. 2, 457-ft. „ 66-ft. „ 32-ft. „



The *Tenyo Maru*, built and engined by the Mitsubishi Zosen Kaisha, Ltd., Nagasaki Works

MITSUBISHI ZOSEN KAISHA, LTD., NAGASAKI WORKS

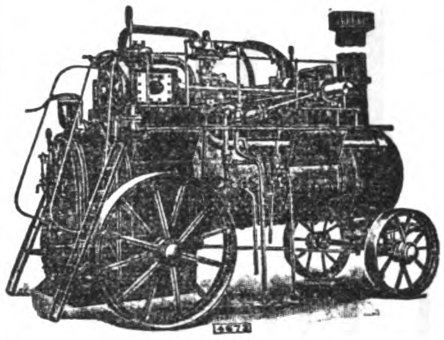
(ex Mitsubishi Dockyard & Engine Works, Nagasaki)

DOCK No. 1			DOCK No. 2			DOCK No. 3		
Extreme Length	523	Ft.	Extreme Length	371	Ft.	Extreme Length	728.9	Ft.
Length on Blocks	513	,,	Length on Blocks	350	,,	Length on Blocks	714	,,
Width of Entrance on Top	89	,,	Width of Entrance on Top	66	,,	Width of Entrance on Top	99½	,,
,, ,, ,, ,, Bottom	77	,,	,, ,, ,, ,, Bottom	53	,,	,, ,, ,, ,, Bottom	88½	,,
Water on Blocks at Spring Tide	26½	,,	Water on Blocks at Spring Tide	24	,,	Water on Blocks at Spring Tide	34½	,,

THE BEST EQUIPPED SHIPBUILDING PLANT IN THE FAR EAST

With Special Facilities for Handling the Heaviest Castings and the Repairing or Building of Ships, Engines, and Boilers
Also Electrical Work

LARGE STOCK OF MATERIAL AND FITTINGS ALWAYS ON HAND

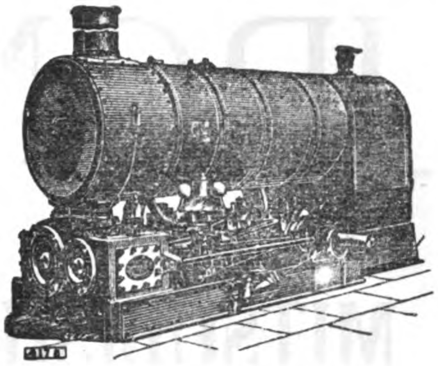


Engines & Boilers

FOR ALL PURPOSES

Ransomes, Sims & Jefferies, Ltd.

IPSWICH, ENGLAND



PORTABLE AND TRACTION STEAM ENGINES, STATIONARY ENGINES, VERTICAL ENGINES, BOILERS OF ALL KINDS, OIL TRACTORS, OIL ENGINES, ELECTRIC ENGINES, MINING MACHINERY.

AGRICULTURAL MACHINERY

STOCKS KEPT IN TIENTSIN

AGENTS:

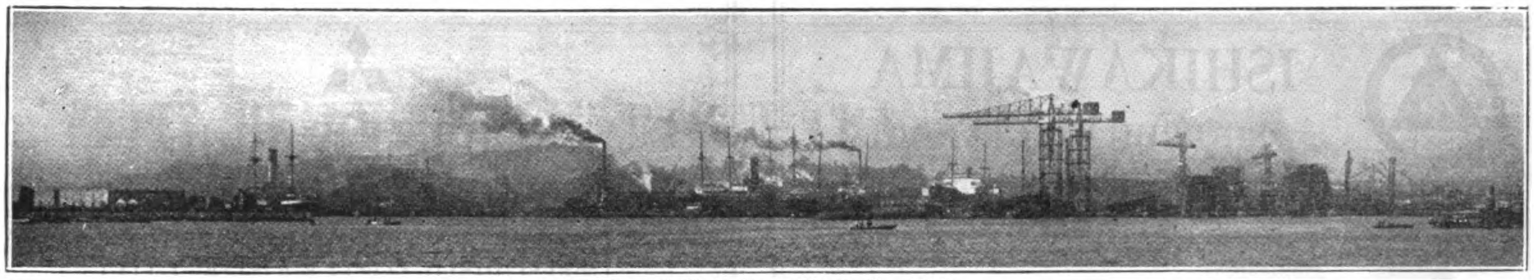
J. WHITTALL & CO., LTD.

SHANGHAI TIENTSIN PEKING

TEL. ADD.: "WHITTALL" TIENTSIN
14, 16 & 18 VICTORIA TERRACE,
TIENTSIN

TEL. ADD.: "WHITSHANG" SHANGHAI
KELLY & WALSH BLDG.,
SHANGHAI

TEL. ADD.: "WHITTALL" PEKING
32 TA JUAN FU HUTUNG,
PEKING



View of Yokohama Dock Co., Ltd.

THE YOKOHAMA DOCK COMPANY, LTD.

Dock Owners, Shipbuilders, Repairers, Engineers, Machinists, Boiler Makers and Warehousemen.
Operating Dockyard, Shipbuildingyard and Storage Warehouses at Yokohama, Japan.

Head Office: **Nagasumi-cho** :: ***Warehouse Office:*** **Midori-chó**

Builders for
United States Shipping Board,
Japanese Navy,
Nippon Yusen Kaisha,
and other Principal Shipowners

Cable Address:
"DOCK"
Code Used:
A. 1. A.B.C. 4th and 5th, Bentley's

DRY DOCKS:

No. 1	625′ × 80′ × 28′
No. 2	380′ × 50′ × 26′
No. 3	480′ × 63′ × 21½′

SHIPBUILDING BERTHS:

No. 1	400′ × 27′
No. 2	490′ × 30′
No. 3	580′ × 36′
No. 4, No. 5	680′ × 38′

WAREHOUSES:

	TSUBO.
Iron Building	8,871.57
Concrete Building	1,636.99
Brick Building	2,011.72
Others	5,807.74

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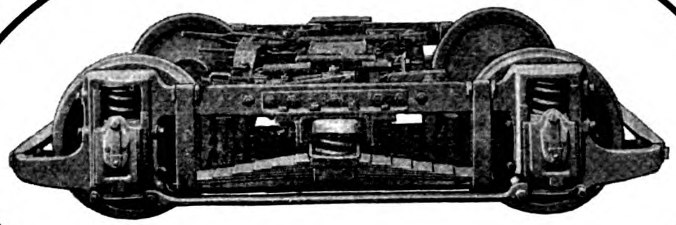
YOKOHAMA
3 KAIGAN-DORI, ITCHOME
YOKOHAMA
WITH TWO BRANCHES IN TOKYO



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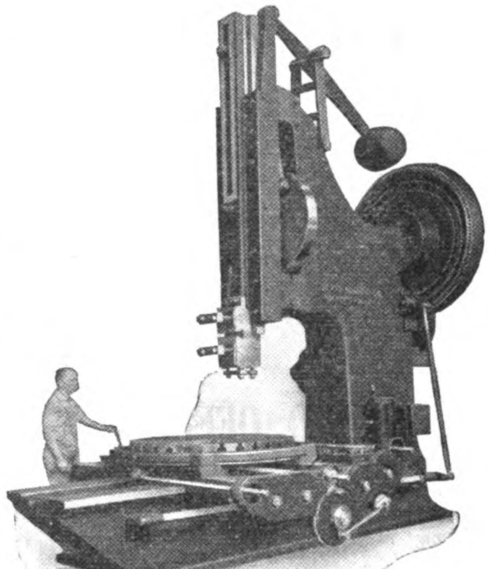

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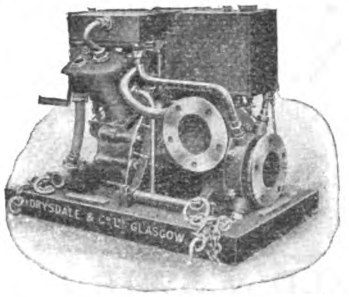

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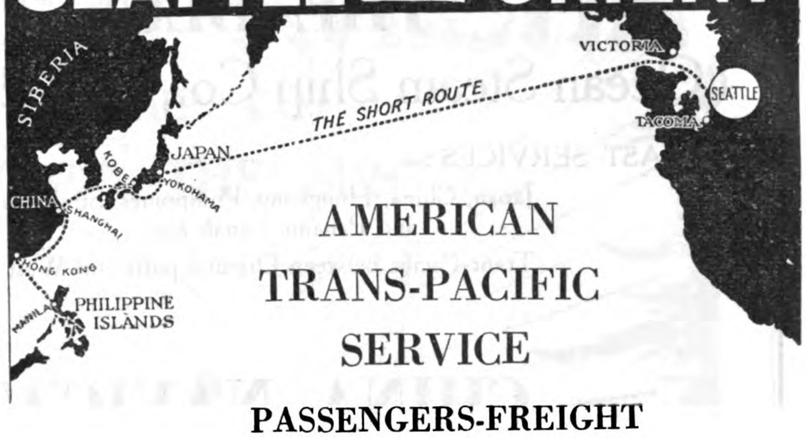

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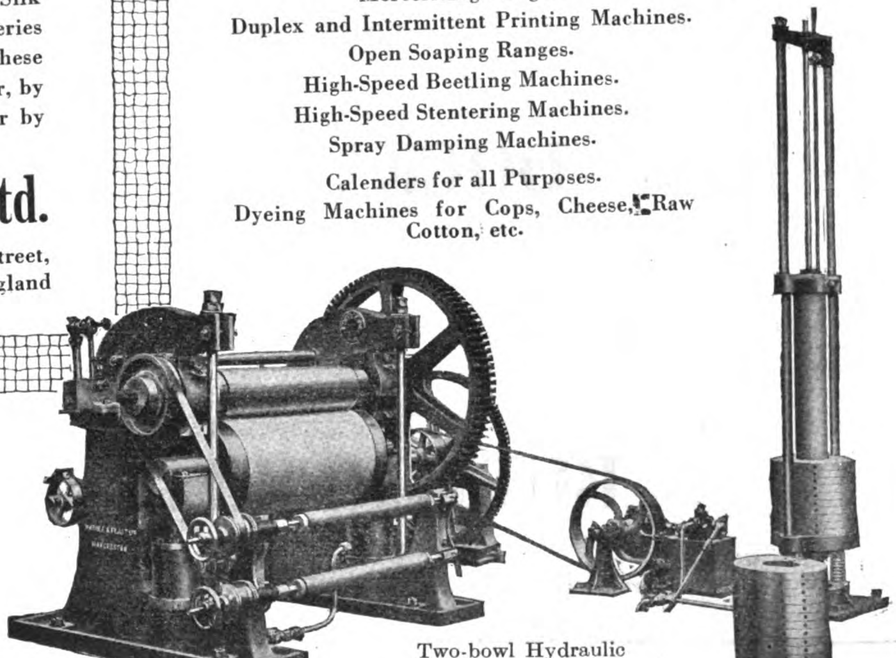

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S.S. "KOREA MARU" sails for San F'cisco, Dec. 11, 1921
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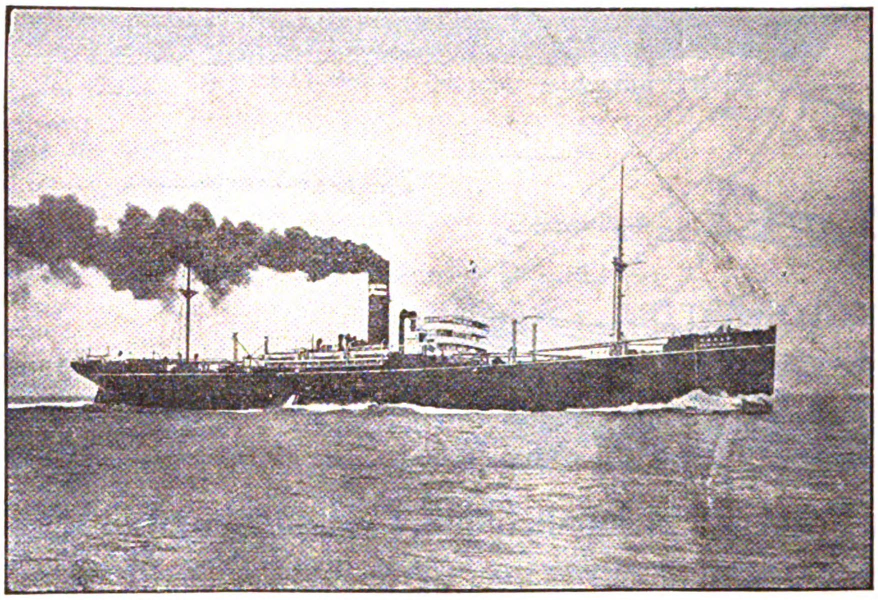

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Paid-up Capital	- -	„ 87,500,000.00
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Tofuku-Maru	9,100	Kashu-Maru	8,800
Chifuku-Maru	9,100	No. 2 Kifunesan-Maru	5,000
Ryufuku-Maru	9,100	Yousan-Maru	5,000
Hankow-Maru	6,400	Taisan-Maru	5,000
Yoni-Maru	11,000	Yuri-Maru	11,000
Taibu-Maru	8,900	Texas-Maru	11,000
San Francisco-Maru	9,100	Tamatsu-Maru	6,600
Naple-Maru	9,100	Eifuku-Maru	9,100
Glasgow-Maru	9,100	Kifuku-Maru	9,100
Yayoi-Maru	8,700	Toyofuku-Maru	9,000
Yaye-Maru	11,000	Raifuku-Maru	9,100
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Buyo-Maru	8,800	Washington-Maru	9,100
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Kofuku-Maru	9,100	Portland-Maru	9,100
Yezari-Maru	6,900	England-Maru	9,100
Yugao-Maru	5,000	Chili-Maru	9,100
Yubaye-Maru	5,000	Argentine-Maru	9,100
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Shanghai-Maru	6,400	New York-Maru	9,100
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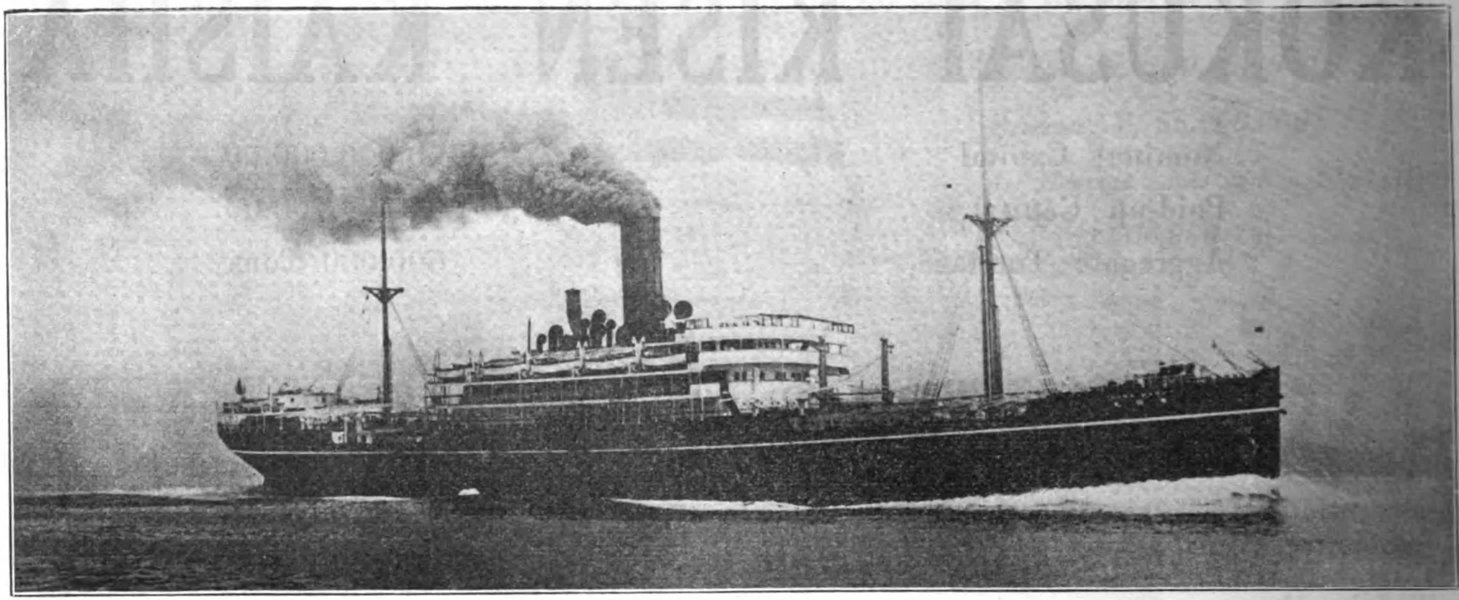

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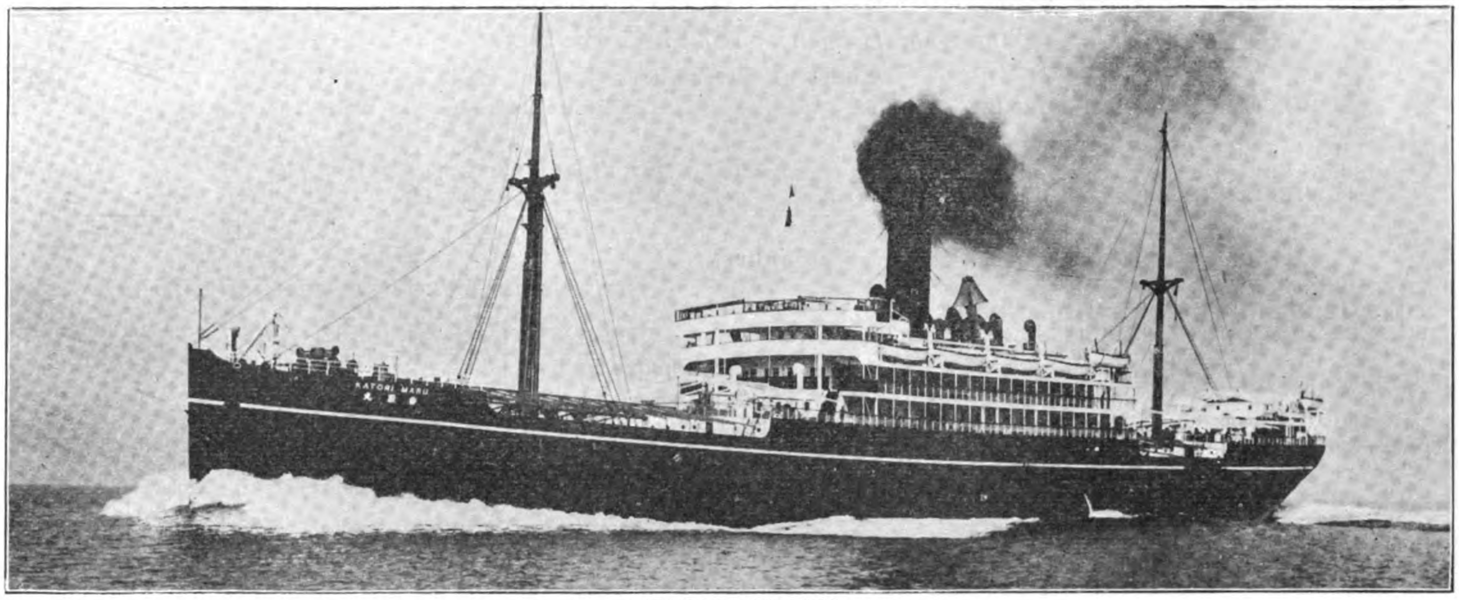

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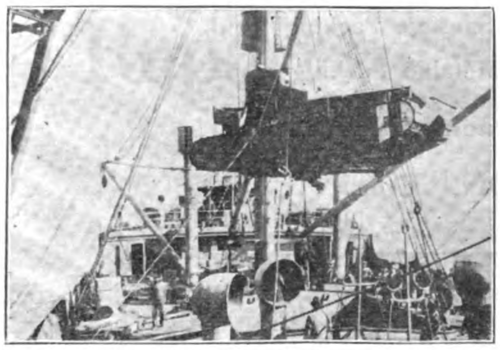
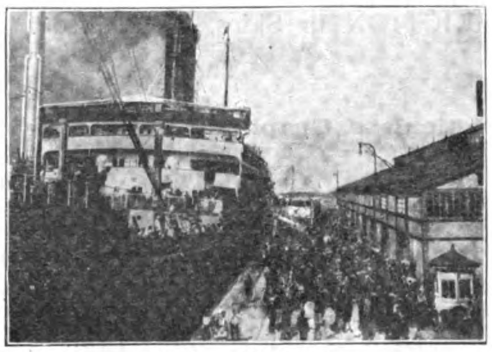
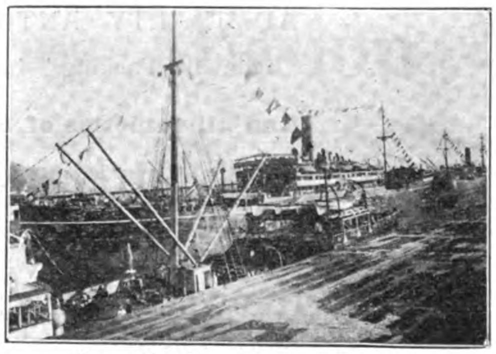


Landing a Tank



Dock at Yokohama



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ENGINEERING FINANCE COMMERCE

Vol. XVII SHANGHAI, DECEMBER, 1921 No. 12

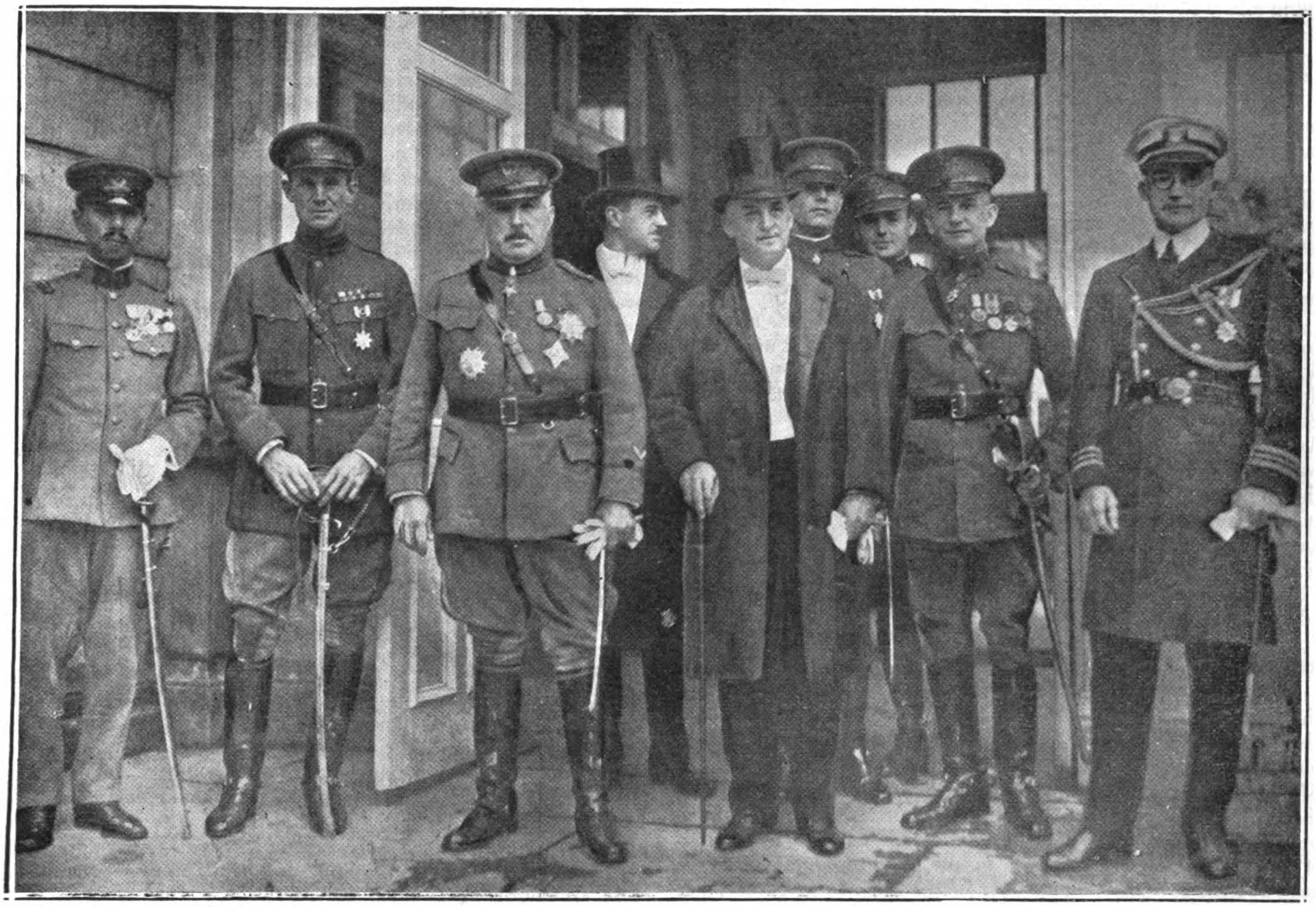

Photo taken in Tokyo

THE SPECIAL MISSION TO THE PHILIPPINES

Left to Right: General Sato, I.J.A; Major Edward Bowditch, Jr., U.S. Army; Major-General Leonard Wood; Mr. Ray Atherton, State Department; Hon. W. Cameron Forbes; Lieut.-Col. Gordon Johnston, U.S. Army; Lieut, Osborne C. Wood, U.S. Army; Col. Frank R. McCoy, Chief of Staff; Lt.-Comdr. Stewart F. Bryant, U.S. Navy

Report of the Wood-Forbes Mission

THE report of the special mission to the Philippines under the chairmanship of Major-General Leonard Wood and Hon. W. Cameron Forbes is remarkably clear in its presentation of actual conditions and emphatic in its findings that the islands are not yet prepared to shoulder the responsibilities attached to independence, and under no circumstances should the American government permit the establishment of a situation in the Philippines which leaves it in a position of responsibility without authority. To achieve this it is recommended that congress declare null and void all legislation which has diminished, limited or divided the authority granted the governor-general under the Jones act.

The mission found that the people are not organized economically or from the standpoint of national defense to maintain an independent government, a conclusion that was inevitable from such matter of fact observers who, in summing up, said that even with the many excellent qualities of the Filipinos, the experience of the past eight years, during which they have had practical autonomy, has not been such as to justify the people of the United States relinquishing supervision of the government of the Philippines, withdrawing their army and navy, and leaving the islands a prey to any powerful nation coveting their rich soil and potantial commercial advantages. Were the United States to withdraw from the islands and terminate their relationship without giving the

Filipino the best chance possible to have an orderly and permanently stable government, it would constitute a betrayal of the Filipino people, a misfortune to the American people, a distinct step backward in the path of progress and a discreditable neglect of national duty.

One of the first steps of the new governor-general has been to prepare the way for the organization of a proper defensive force and the report clearly shows that the Filipinos are well able to stand taxation for the maintenance of such a force. The per capita taxation in the islands was only $2.50 in 1920 against $23.78 in Great Britain (1914-15), $9.92 in the United States (1914-15), $5.57 in Japan (1915-16), $17.33 in the Argentine and $7.79 in Brazil, or a lighter per capita taxation than any of these countries. One reason for this light burden is because the United States has borne all the costs of military and naval establishments necessary for the defense of the islands and other expenses incidental to the maintenance of the sovereignty of the islands, including international diplomatic and consular representation. The bonded debt of the islands in 1920 was $22,000,000 or $1.81 per capita, compared with $25 in Cuba, $237 in the United States, $853 in England and $1,159 in France. The Dutch East Indies with $1.92 per capita, is the nearest to the Philippines and China next with a little less than double that of the islands.

In these figures alone are shown some of the benefits attached to being a citizen of the Philippines under the paternal and beneficent rule of Uncle Sam. No wonder they clamored for independence, and thought not of consequences, and wanted the United States to accept all responsibility without exercising authority. An illuminating feature of the benefits derived from the connection with the United States is seen in the matter of free trade which they now enjoy. In 1920, says the report, nearly $40,000,000 of sugar was exported to the United States, the duty on which would have been six to eight per cent. of its value, according to its polarization. It is problematical, the report goes on to say, how well Philippine sugar could have stood the handicap of eight per cent. added to the high cost of freight from the Philippines to the United States. The value of cigars exported to the United States was $10,500,000 and the duty on these at the present rate would amount to about $30,000,000, which, if it had been paid, would have closed the markets of the United States to these cigars. There would also have been a similar closing of the American markets to Philippine leaf tobacco. The trade in embroideries now valued at $7,500,000 a year would have to pay a duty of $4,500,000. As there is no other market for this product, the industry would have been ruined. In these few items alone we get a glimpse of what free trade with America means to the islands. Here we have at least $37,000,000 taken out of the American treasury, and presented to the Filipinos, permitting their industries to expand to that extent and more, for to this must be added the profits and other direct and indirect advantages accruing to the people from the industries so created. If it means anything at all, it means that the American people have presented their wards with at least $60,000,000 a year in order that they might progress and be happy. And with all this the individual Filipino was taxed only $2.50 and staggered under the stupendous debt of $1.81! It begins to look as though they have been living as near as any people can ever hope to get to Utopia. Yet, they wanted independence. Such is human nature.

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The body of the report deals with, first, the purpose and instructions of the mission as set forth in the letter of President Harding to the secretary of war and the letter of instructions from the latter to Major-General Wood, which, amongst other things, bears on the more important strategical position and future of the islands in the following words :—

"The Filipino people have for ages, due to the fact that the sovereignty of the Philippine Islands rested first in Spain and then in the United States, been protected in the ownership of territory and potential wealth out of all proportion to that of their neighbors. It is important to determine whether reasonable plans exist for the utilization of these resources by the Filipino people in order that their unused land and resources my not continually be a source of temptation to their less fortunate, but probably stronger neighbors, and whether on the withdrawal of a strong sovereignty from these islands these resources would remain exclusively available for the Filipino people."

"Certainly it would be a vain thing to turn the Philippine Islands over to the Filipino people without reasonable assurance that the resources of the islands would remain the heritage of the people of the islands. The pleasing of the Filipinos of this generation would be a minor satisfaction if it were believed that it would result in the bondage or destruction of the Filipino people for all time hereafter."

The report than goes on to outline the travels and investigations of the mission and gives a historical sketch of the islands and an analysis of the character of their people. Coming to present conditions the mission declares:

Present Conditions

There has been a progressive transfer of government to the people of the islands, and at the present time it is very largely in their hands. So extensive has been the transfer that many fail to realize that there still continues in the islands a decisive American control that assures the maintenance of an orderly government, secure against disturbing influences from within and without.

In view of the difficult situation which existed after the insurrection, the difference in language, customs and in conceptions of citizenship obligation, the progress which has been made in the twenty-three years of American occupation is extraordinary. It is a high tribute to Americans and Filipinos alike. The animosities have disappeared and there remains a spirit of confidence and friendliness for the American people throughout the archipelago. Much has been done, but much remains to be done.

While there has been retrogression in the efficiency of most departments of the government during the past few years, we do not feel that the responsibility for this rests solely upon the Filipinos or that they should be unduly blamed for such failures as have occurred, as the ultimate responsibility for the selection of responsible officers and for the exercise of proper supervision was in the hands of the American governor-general, whose duty it was to exercise due care to appoint competent men at the heads of departments and bureaus, and, above all, to exercise proper supervision over them.

A reversal of policy is not needed now, but time for the Filipinos, under careful but friendly supervision, to absorb and master what is already in their hands. We must remember that the good qualities of the people, their enthusiasm and their determination cannot take the place of experience.

We must build up an informed public opinion, a stronger spirit of civil responsibility and a better appreciation of the obligations of citizenship. In this the island press has a vitally important part to play. The task of building up a truly representative form of government is made much easier by the fact that the great bulk of the people are Christians, that they are free from caste distinctions, that although Oriental in blood and birth, they are essentially Western in religion, form of government and in ideals and aspirations, and that their true sympathies and affiliations lie with the great Christian nations.

The influence of our efforts to establish representative self-government in the Philippines extends far beyond the Philippines. It reaches every part of the Orient where free institutions and representative government are the dreams of the people.

The great bulk of the Christian Filipinos have a very natural desire for independence ; most of them desire independence under the protection of the United States; a very small percentage desire immediate independence with separation from the United States; a very substantial element is opposed to independence, especially at this time. The Moros are a unit against independence and are united for continuance of American control and, in case of separation of Philippines from the United States, desire their portion of the islands to be retained as American territory under American control. The Pagans and non-Christians, constituting about [illegible] per cent. of the population, are for continued American control. They want peace and security. These the Americans have given them. The Americans in the islands are practically a unit for the continuance of American control.

The people, as a whole, are appreciative of the peace and order which prevails throughout the islands. Many do not understand what independence means, or its responsibilities. They are living under the best conditions they have ever known. It is not generally realized that the American government cannot be expected to assume responsibility for the results of internal disorders, particularly as they affect the nationals of other powers, the treatment of foreign capital and external political relations, unless the United States retains a certain measure of control.

The great work which the American commercial population and organizations have done in the islands should not be overlooked. It has contributed greatly to the betterment of conditions. They have built up and established business and credit from one end of the islands to the other. They have always been a strong force in the support of law and order, intensely American in sentiment and, on the whole, a good, stabilizing and helpful influence. At times they have been impatient, and justly so, with the discouragement of American business efforts and there have been conditions which have given rise to strained relations between individuals Americans and Filipinos, but never resulting in any disturbance of public order.

The American and foreign church missions and schools and charitable associations have done much to improve the spiritual and physical condition of the people, and to build up better relations between the Filipinos and Americans.

Generally speaking, administrative departments of the government are topheavy in personnel and enmeshed in red tape. There is a vast amount of paper work. The methods of the administration are purely bureaucratic. There is a lack of supervision and personal contact.

The general administration of the Philippine government in 1913, the period of greatest efficiency, was honest, highly efficient and set a high standard of energy and morality. Inherited tendencies were being largely replaced by American ideals and efficiency throughout the Philippine personnel, but the time and opportunity were both too short to develop experienced leaders and direction in the new English-speaking and American-thinking generation. Both the political and administrative leaders were still Spanish-trained and Spanish-speaking, and many are so to-day.

It is the general opinion amongst Filipinos, Americans and foreigners, that the public services are now in many particulars relatively inefficient; that there has occurred a slowing-down in the dispatch of business and a distinct relapse towards the standards and administrative habits of former days. This is due in part to bad example, incompetent direction, to political infection of the services, and, above all, to lack of competent supervision and inspection. This has been brought about by surrendering, or failing to employ, the executive authority of the governor-general and has resulted in undue interference and tacit usurpation by the political leaders of the general supervision and control of departments and bureaus of the government, vested by law in the governor-general.

Again, the legislature has passed laws tending to demoralize and introduce into the civil service the infection of politics. For example, numerous exemptions from the requirements of the civil service and many provisions for temporary employment. All these defects can and—unless we fail to understand the spirit of the legislature and the leaders—will be corrected in the islands.

Public order is maintained principally by the constabulary, a force of approximately 5,800 officers and men. This organization has proved itself to be dependable and thoroughly efficient. In discipline, morale and appearance it still bears the strong impress of the carefully selected officers of the United States army who organized, trained and developed it.

This force, excellent as it is, is designed to meet the police needs of the situation in time of peace. There is no adequate local organization of the Philippine people for defense of the islands against aggression. The American government should at once take the necessary steps to organize, train and equip such a force.

There has been some lowering of standards, due principally to the sudden loss of the bulk of the experienced American officers, who left the service to enter the world war, and to the effects of the low rate of pay which resulted in many leaving the service; also to the demoralizing, and at times intimidating, effect of political influence, the detached nature of their duties, in frequent inspections and frequent change of officers. But on the whole this force is a very satisfactory one and is entitled to great credit for its morale, efficiency and orderly effective performance of duty.

Some years ago a school for constabulary officers was organized and has been in operation with excellent results. No men are now appointed to the constabulary who are not graduates of this school, where they have undergone a careful preparation and training. The quality of the graduates shows what can be accomplished when opportunity for careful training is offered.

Public order is excellent throughout the islands, with the exception of minor disturbances in the Moro regions, due principally to energetic and sometimes over-zealous efforts to hasten the placing of Moro children, especially girls, in the public schools, and to the too sudden imposition upon the disarmed Mohammedans of what amounts to an obsolute control by Christian Filipinos. It is also due in part to failure to give adequate representation in local governments to Moros.

The report then takes up the administration of justice which may be briefly summarized in the statement that approximately 50,000 cases are pending in the courts to-day, including some 8,000 probate and guardianship cases. Conditions are steadily growing worse and with present personnel and methods the dockets will never be cleared. In brief, the administration of justice is unsatisfactory, slow and halting, with a widespread feeling among the people that political, family and other influences have undue weight in determining issues. The land title office also comes in for sharp criticism. In 1913 the insular government had a thoroughly efficient and trained bureau of lands and an experienced and effective court of land registration. To-day the inefficiency of the bureau is due, in part, to lack of trained and experienced personnel, to inefficient management and lack of funds. This has resulted in an increase of abuses by which the poor farmer and homesteader, ignorant of his rights, is forced off the land by his richer and more unscrupulous neighbor. The situation tends to breed discontent and must be corrected.

Public instruction has been retarded largely through the lack of competent teachers, especially in the number of English-speaking teachers. It is recommended that at least 1,000 English-speaking teachers be employed and liberal allowances made for transportation to and from the islands. The work of the bureau of science, probably the most important institution in the islands, attaining world-wide distinction, has suffered through lack of funds and adequate personnel. The work of this bureau is of inestimable value to the islands and to the world at large, and it is imperative, adds the report, that it be reorganized and placed on its former high basis. The excellent health service which existed before 1913 has become inert and although much of the personnel remains, it has lost its zeal and vigor. Appropriations for sanitary work are insufficient. Under economic conditions, the mission touches on matters of pertinent interest to our readers, and we reproduce this in full.

Economic Conditions

We are pleased to note and record many evidences of progressive development in the islands as indicated by the following significant figures:

The Postal Savings Bank was started in 1907, and by 1914 it had 40,000 depositors and $675,000 in deposits. In 1920 these had reached 107,000 depositors and $1,612,500 in deposits.

The law requires that 1 per cent. of the gross business done in the islands be paid to the government in the form of taxes. This business was computed to be $200,000,000 a year in 1907, when the tax was first imposed, and had increased to $325,000,000 in 1913. In 1920 it had reached the figure of $863,000,000. The number of cigars manufactured had increased from 300,000,000

to 500,000,000. The total resources of commercial banks rose from $15,000,000 in 1906 and $31,000,000 in 1913, and are now estimated to be $215,000,000; this, however, includes the impaired resources of the Philippine National Bank without reduction for losses. Money orders sold increased from $8,000,000 in 1913 to $17,000,000 in 1920, and postage receipts from $380,000 in 1913 to $780,000 in 1920. Telegraph receipts show a similar increase. The earnings of the Philippine railway have risen from $380,000 in 1913 to $750,000 in 1920, and the Manila Railroad from $2,400,000 in 1914 to $5,900,000 in 1920; this latter, however, is partially to be explained by the sharp increase in the mileage and rates.

All this development is very gratifying and shows how rapidly the Philippine people respond to improved conditions of transportation, finance, public order and markets, brought about since the American occupation. The sharpest advances have been made during the war, as was to be expected, as the Filipinos had few additional war burdens placed upon them and were able to take advantage of the great increase of prices, which brought them unexampled prosperity.

The country is suffering from the general world-wide depression at the present time; the prices of products have fallen off very sharply, but even this is less acute than in other countries.

It should be noted, however, that whatever mistakes have been made here, they have not been sufficient to arrest the steady rate of progress which these figures prove to have taken place.

Your mission has had a careful report prepared showing the gross trade of the Philippine Islands. From 1903 to 1909, the figure was about stationary. Nineteen hundred and nine was the year in which the Payne Bill was passed creating free trade between the Philippine Islands and the United States. In the first three years of free trade the trade with all countries nearly doubled. Beginning with 1916 the trade went sharply upward until in 1920 it reached the remarkable total of $300,000,000.

An analysis of the trade shows that a curve indicating the exports and imports from the United States follows almost the same lines as does that of total trade. Roughly speaking, two-thirds of the business of the country, or $200,000,000, is trade with the United States, and one-third with all other countries. The proportion of gross business done with the United States has been steadily increasing. As the trade with the United States pays no customs duties and the bulk of the increase has been in that class of trade, the result is that the total revenues of customs has shown a tendency to fall off, while the cost of collection shows a steady increase.

In case free trade were to be taken from the Philippine Islands, it is probable that the closing of the rich markets of the United States to the products of the Philippine Islands would be very sharply felt. While the Philippine government would receive customs duties on an important part of their imports that now come in duty free, it is believed that the first effect would be a very serious blow to trade. For example, in 1920 nearly $40,000,000 of sugar was exported to the United States, the duty on which would have been six or eight per cent. of its value. It is problematical how well Philippine sugar could have stood the handicap of eight per cent. added to the high cost of freight from the Philippines to the United States. The value of cigars exported to the United States was $10,500,000; the duty on these at the present rate would amount to about $30,000,000, which would practically have closed the markets of the United States to these cigars. There would have been a similar closing of the United States' markets to leaf tobacco. The collector of customs estimates that the trade which has grown up in Philippine embroidery now reaches $7,500,000 a year and would have to pay a duty of $4,500,000. As there is no other market for this product, he believes the industry would be practically ruined.

In the main, it is believed that the loss in internal revenue, were the stimulus of free trade to business removed, would be greater than would be the increased collection of customs duties. In this connection it is interesting to note that the increase in internal revenue started when free trade was given and practically offset the drop in customs receipts at the time.

Further analysis of the customs shows that the principal articles exported, measured in value, to have been copra, $5,188,014.50; hemp, in which the Philippine Islands have a virtual monopoly, $58,191,550; coconut oil, $31,664,158.50; sugar, $15,804,390; and tobacco, $13,575,313.*

Finances

In 1905, the Philippine government was put on a thorough business basis. All services rendered by one branch of the government to others were paid for, and the books were so kept that the appropriations did not include any inter-bureau or inter-governmental payments. The law has since been changed, so that the present cost of government includes items of receipts for services from other branches of the government, which makes analysis difficult and exact comparison impossible. The books are so kept that these amounts cannot be ascertained without an analysis of governmental accounts involving prohibitive expense. So that the gross figures of receipts and expense are padded on both sides by inter-governmental charges which are neither real receipts or expenditures as they are payments by the government to itself. The accounts should be so kept that these fictitious entries would be eliminated, in order to enable the officers of the government to get a true picture of government costs.

Certain figures, however, stand out so boldly that they cannot be questioned. The rate of taxation has been sharply advanced. The insular gross revenues from taxation in 1913, before the Filipinos were given virtual control of their government, were $12,500,000, as opposed to $28,000,000 in 1920, an increase of 124 per cent. Government expenditures show a still greater proportion of growth. This increase in the general cost of government has not been accompanied by a proportionate increase in efficiency: on the contrary, as has been noted elsewhere, there has been a general falling off in efficiency.

The per capita revenue from taxation has risen from $1.32 in 1913 to $2.50 in 1920. This compares with the per capita taxation of $23.78 in Great Britain (1914-1915), $9.92 in the United States (1914-1915), $5.57 in Japan (1915-1916), $17.33 in the Argentine Republic (1915), and $7.79 in Barzil (1915), from which it will be seen that the Filipino bears a smaller burden of taxation that the natives in any of the other cited countries.† One reason the burden of taxation is so light in the Philippine Islands is because the United States has borne all costs of military and naval establishments necessary for the defence of the islands, and other expenses incident to the maintenance of the sovereignty of the islands including international diplomatic and consular representation.

Of the total revenues of $40,500,000,‡ $28,000,000 is from taxation and $10,500,000 from operating income and commercial and industrial units; this does not include earnings of the railroad, which the government owns through ownership of the stock.

An analysis of revenue derived from taxation shows the receipts from internal revenues to be $18,500,000 or two-thirds of the total. This internal revenue collection is nearly four times as heavy as the collections of 1913.

The bonded debt of the Philippine Islands in 1920 was $22,000,000, for the redemption of which is laid aside nearly $5,000,000 sinking fund, so the net liability is something less than $17,500,000. A comparison with the debt of other countries demonstrates that the Philippine Islands has a smaller bonded debt than most countries, the per capita being $1.81, compared with $25 in Cuba, $237.07 in the United States, $853 in England, and $1,159 in France. The Dutch East Indies, with $1.92, is the nearest, and China

* These figures are taken from the Philippine census, and are all for 1918.

† These figures are taken from the World Almanac, 1917.

‡ The census shows "income" $49,000,000; this, however, is incorrect because analysis proves that it includes moneys from the sale of bonds.

next with a little less than double that of the Philippine Islands.* It will be seen that the recent act of congress increasing the authority of the Philippine Islands to borrow was highly conservative and could be safely further increased without jeopardizing the financial stability of the government. Bonds and notes of the Philippine Islands have been made exempt from federal taxation and are received on deposit as currency reserve. Although not directly guaranteed, it is understood that the credit of the United States government is behind them; this accounts for the high market value of these bonds.

In addition to the insular revenues, there are the provincial and municipal revenues. These are expended by the provinces and municipalities by vote of their own local authority. An examination of their accounts shows a similar expansion, the receipts and expenditures having increased about 100 per cent. in the past eight years.

The government expense and cost of materials have shown a tendency to a sharp increase. And it is to be noted that a number of new bureaus and offices have been created.

The Philippine National Bank

The story of the Philippine National Bank is one of the most unfortunate and darkest pages in Philippine history. This bank was started in 1916 and a law passed compelling all provincial and municipal governments to deposit all their funds in it; and at the same time arrangements were made to transfer from other banks all government funds there deposited, except trust funds which were held on deposit in the United States; later the bank was put into a position to get control of these moneys and reserve funds. The sum of $41,500,000, held for the conversion of currency, was transferred to the Philippine Islands, the bank making a large profit in exchange in doing so. Much of it was then loaned out to speculative concerns under circumstances which have led to grave doubt as to the good faith of the transactions.

A man presumed to be experienced in banking was brought from the United States and took the first presidency which he held a short time. An American inexperienced in banking was then put in charge, and upon his death a Filipino also without banking experience became president. The result of all this has been a series of banking losses estimated by the insular auditor to reach the severe total of $22,500,000. A partner of Messrs. Haskins and Sells, certified public accountants of New York, after a careful examination of the bank, makes the following comment:—

> Our examination thus reveals the fact that the bank has been operated during almost the entire period of its existence prior to the appointment of Mr. Wilson as manager in violation of every principle which prudence, intelligence, or even honesty, dictate.

As a result of these findings, charges have been filed against General Concepcion, a former president of the bank.

The government became alarmed at the seriousness of the situation and secured the services of an experienced banking man from the United States, under whose conservative guidance the affairs of the bank are in a fair way to be put on a sound footing. But a large part of the assets of the bank have been loaned to concerns which will be unable to repay for many years—very largely in sugar centrals and coconut oil factories. These loans were made in excessive amounts during the period of boom prices; and minimum precaution in regard to security was taken, with the result that the bank has allowed its reserves to run down much lower than required by law, is unable to meet its current obligations, has had to ask other banks not to press for the redemption of its notes, and has further had to ask time for the payment of its obligations to many banks in Shanghai representing many countries, to whom it owes large sums of money as a result of losses incurred in speculation in exchange transactions.

The bank also established branches and agencies throughout the Philippine Islands, in charge of which they placed untrained Filipinos, and without exception these branches have been mismanaged. Of the four branches in which the examinations have been completed criminal charges have been preferred against the managers of each one.

These losses have seriously involved the Philippine government, and the fact that it has not been able to meet its obligations has seriously impaired its credit. We have been informed by representatives of banks in North Borneo and Japan that they have received instructions not to honor the notes or drafts of the Philippine National Bank.

The currency resources have been depleted, the silver on deposit to redeem the currency has been pledged and used for other purposes. The fund for the maintenance of the parity of gold and silver is involved in these losses, with the result that instead of a metallic and cash basis for the currency, its principal support now is the pledge of the Philippine government and the confidence on the part of the public that the United States will not permit these things to happen again. The currency is now practically a fiat currency.

In view of good earnings, moderate expenses, inherent wealth, a small public debt, and backed by the credit of the United States, the problem of rehabilitating the credit of the Philippine Islands should be an easy one. The lesson has been a bitter one for the Filipinos and the gravity of the mistake is generally appreciated.

One of the functions of the National Bank was to manage government exchange. Having transferred all the funds usually available for exchange to Manila, and then loaned the money in such a way that it could not be recovered, the government had to discontinue selling exchange. The rates ran up as high as 15 per cent., which was equivalent to a depreciation of the Philippine currency to almost that amount, which resulted in great hardship to the inhabitants of the Philippine Islands, especially those engaged in business.

The Philippine Islands, contrary to general belief, have maintained all of the expenses of civil administration since the beginning of American occupation from insular revenues and without assistance from the treasury of the United States, which has, however, defrayed all the costs of the military and naval establishments and fortifications. The only aid received by the Philippine government from the United States has been a $3,000,000 appropriation for famine relief made in 1903.

Public Works

In the matter of public works, your mission has to report both favorably and unfavorably.

The government and people of the islands realize the value and necessity of public works and large appropriations from current revenues have been made annually for such objects as the construction of roads, bridges, irrigation systems, school houses, markets, port works and artesian wells among others. We find, however, an undue increase in the cost of public works, due in many instances to construction by administration instead of by contract; this has necessitated the purchase of an equipment ordinarily furnished by contractors. There has also been a deterioration in the quality of the work performed in this service. We find also a lack of competent supervision.

On the other hand, there has been a great deal of excellent work done. The director, a Filipino, is a man of unusual capacity and foresight, and he impressed the members of the mission most favorably.

An important proportion of all revenues of the government is allocated to public works. And in the opinion of this mission this proportion should be increased.

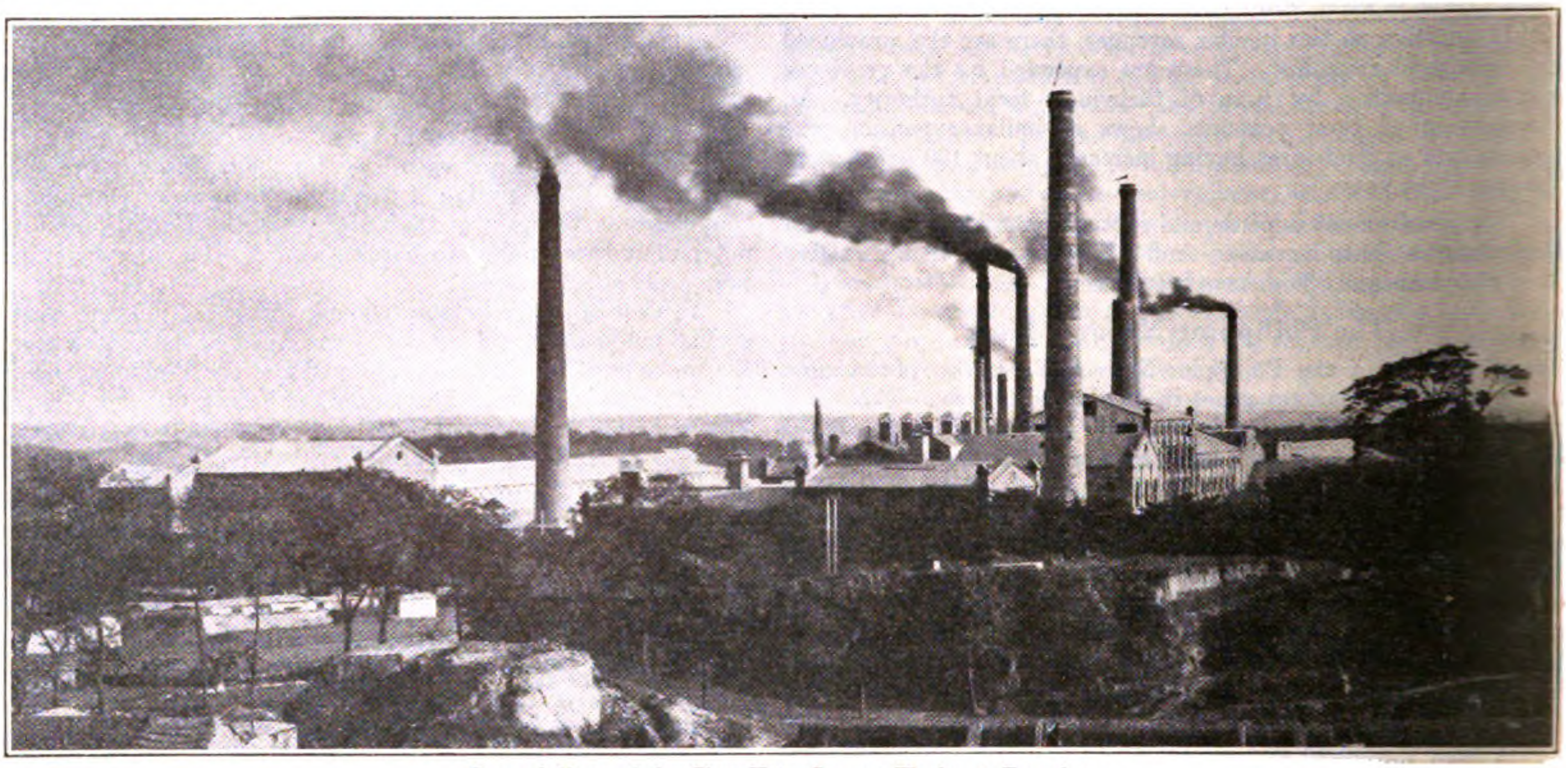
In the last three years there has been a notable progress in construction of irrigation systems. Sixteen projects have been undertaken, involving an expenditure of $4,640,158. Many more projects are under consideration and are awaiting the availability

(*Continued on page 825*)

* These figures are taken from the World Almanac, 1917.

The New Plant of the Chee Hsin Cement Co., Ltd.

By G. A. BOOTH



General View of the Chee Hsin Cement Works at Tangshan

AN object lesson in that progressive spirit which is becoming more and more necessary in order to insure industrial success in China, is furnished by the manner in which the Chee Hsin Cement Co. has nearly completed a new cement plant project of considerable magnitude in Tangshan. In spite of any business depressions which have existed, or are supposed to have existed this company has kept its faith in China's ultimate prosperity. They have not only erected a new cement plant which will more than double their present output, but have spared neither pains nor expense in equiping this plant in the most modern manner with the newest and best types of machinery.

The total yearly output of the present plants is 700,000 barrels of cement. The new plant will increase this by 1,000,000 barrels, making a total production of 1,700,000 barrels yearly. Construction work was started on the new plant in April of this year and the buildings were completed in four months. Due to delays in shipment of machinery, however, it is expected that the new plant will not be in operation until the latter part of December or the 1st of January. The process employed and the plant throughout is especially designed by the well-known cement work designers Messrs. F. L. Smidth & Co., Copenhagen and New York, and embodies the most up-to-date methods and equipment.

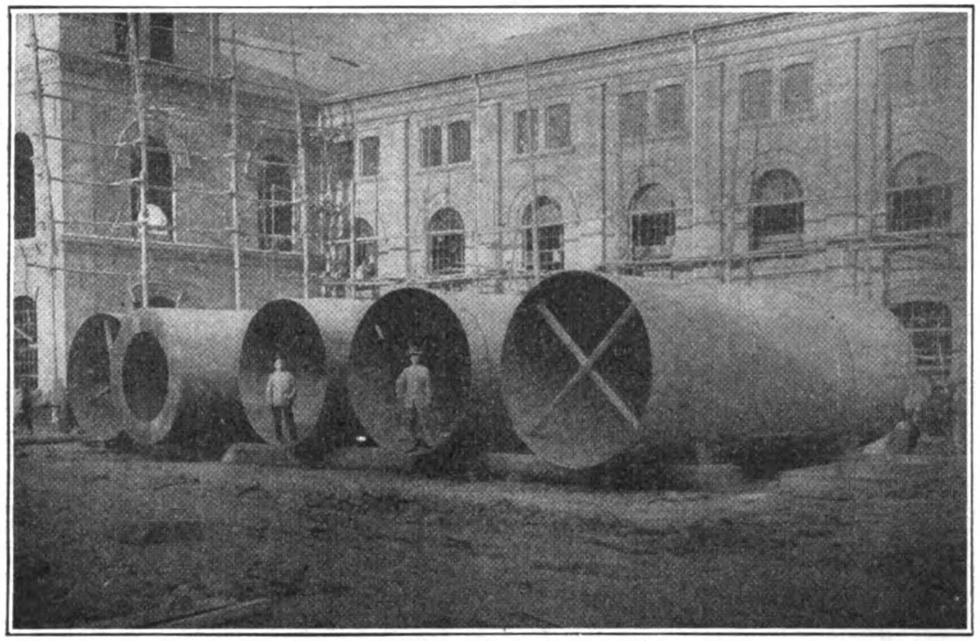
The raw materials mill and the finishing mill are the largest of the new buildings. They have floor areas, respectively, of 36,000 and 4,350 sq. ft., and average 65-ft. in height. Both are of fireproof construction, being built entirely of reinforced concrete and brick, with corrugated iron roofs on steel trusses. In their construction were used 2,700 tons of cement, 9,000 tons of sand, 13,500 tons of gravel, 300 tons of reinforcing steel, 3,000,000 bricks and 150,000 fire bricks. About 850,000 board feet of lumber was used for framing and cement form work, and 20,000 cubic yards of earth was excavated for foundations. Fig. 1 shows a general view of the Tangshan works, and Fig. 2 is a closer view of the raw materials mill and kiln house.

In laying out the new plant a unit system was followed, so that not only can the new plant be operated in conjunction with the old plants in practically every department, but new units can easily be added at any time, should the condition of the market justify a still further increased output of cement.

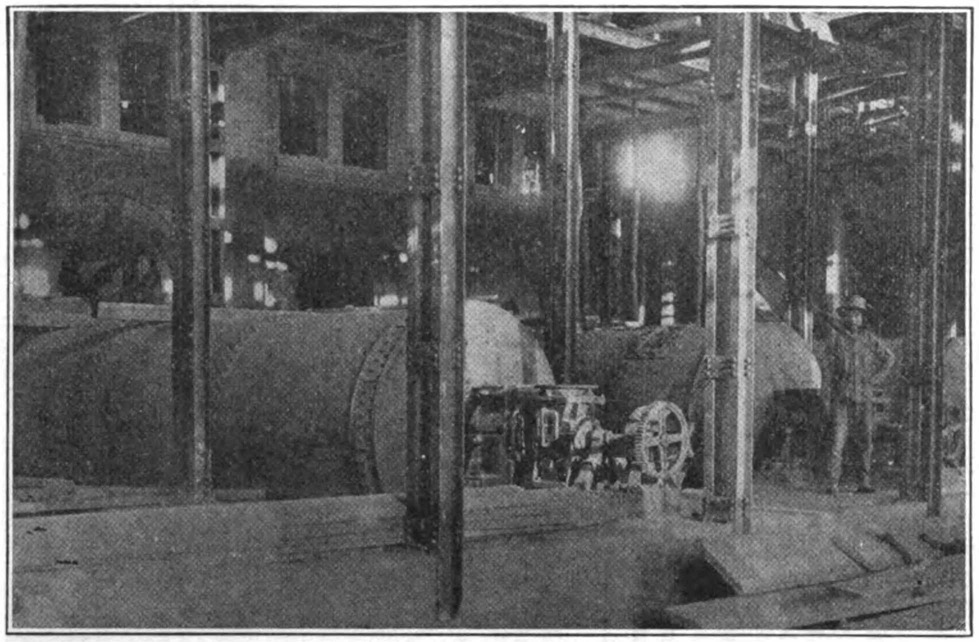
All of the machinery in the new plant will be driven by electric motors. This feature, while not exactly an innovation, represents the most recent practice, and is a method which even some extensive foreign plants have not as yet adopted, steam engine drive still being used for some of the apparatus. Many of the machines are extremely heavy and require a large amount of power to start them moving from rest, and some of the heaviest parts revolve at very slow speeds. To drive such a load without using a large number of gear reductions or belts requires motors which are of unusual type and are expensive, and these have been used only in the most up to date plants.

For the new plant alone there are over 3,000-h.p. of motors. Some of these are quite large, there being five of 300-h.p., two of 200-h.p. and six of 100-h.p. for driving the larger machines. The remainder are in units of from 25 to 50-h.p. each and are used for driving conveyors, fans, elevators, etc. All motors are of 3-phase, 25-cycle, alternating current type, the small ones operating at 220 volts and the large ones at 2,200 volts. The latter voltage is considered somewhat high for factory motors, but great care has been taken in their installation and no difficulty is anticipated on this score. Current is distributed to the high voltage motors by paper insulated, lead covered, steel armored cables laid underground in brick ducts or in steel conduit, and by rubber covered cables to the low voltage motors. Ample electrical pro-

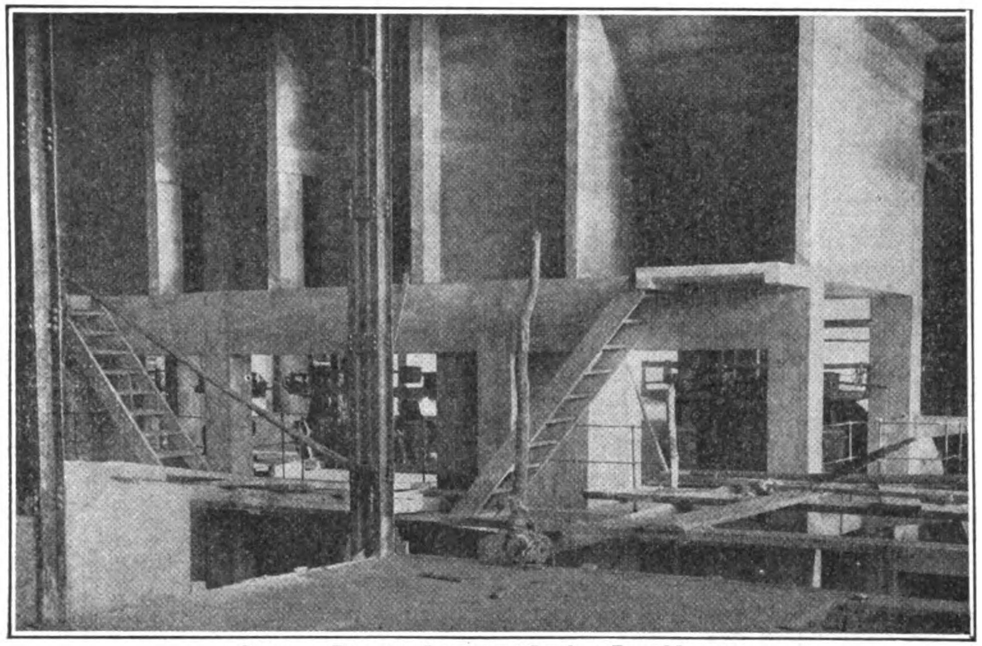
NEW TANGSHAN PLANT OF THE CHEE HSIN CEMENT CO., LTD.



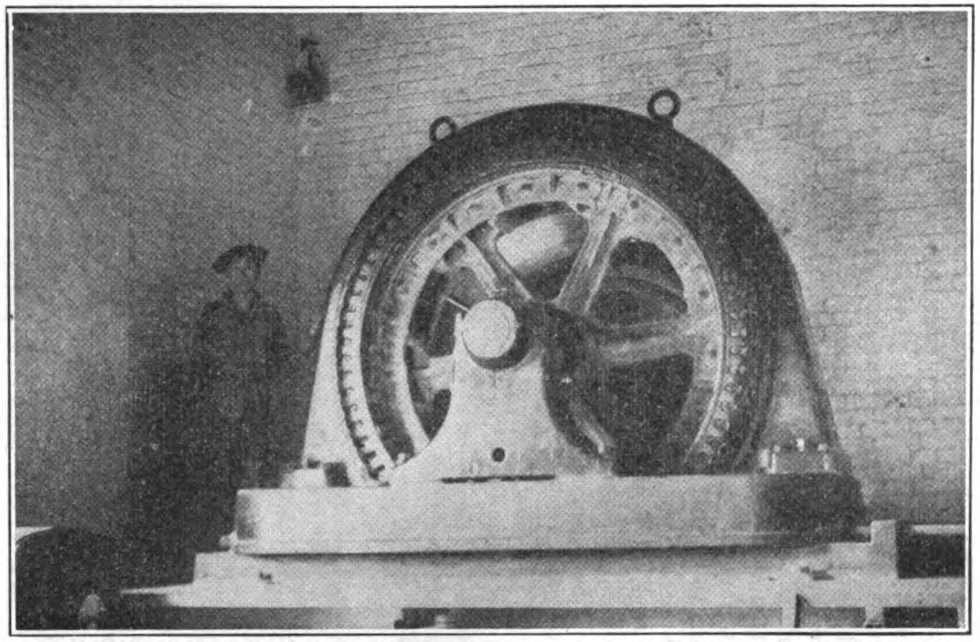
A Rotary Kiln as it Arrives in China



Tube Mills for Crushing Raw Materials



Concrete Bins for Storage of Broken Raw Materials, with Feeding Tables in Background



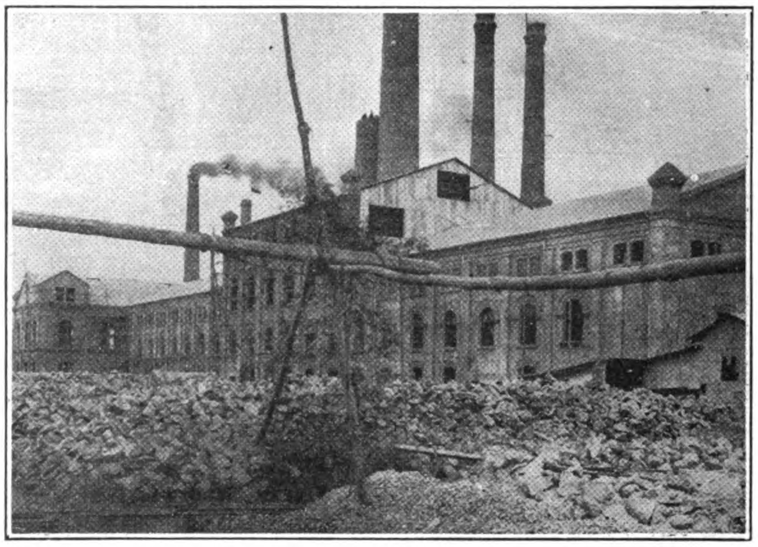
A 300 H.P., slow speed, direct coupled motor, driving a combined ball and tube finishing mill. The motor is in a separate room with shaft extending through a hole in the wall. This keeps the windings and bearings free from dust

tection is afforded by the latest type of ironclad switchgear, which also prevents personal contact with any high voltage parts. Small transformers in the plant supply the 220-volt, 3-phase power for small motors, and 110-volt, single-phase for lighting. Only general lighting is required and high candle-power incandescent gas filled lamps will be used.

In order to insure reliable and uninterrupted electric service, power for the new cement plant will be supplied from the Kailan Mining Administration's steam turbine plants. As this power is generated at 25 cycles, all of the motors in the new plant are built for that frequency. An outdoor type substation of about 4,000 K.V.A. capacity will be erected at the cement plant to transform the K. M. A. voltage of 30,000 to 2,200 volts for distribution to the motors, but until this apparatus arrives, power for the new motors will be supplied, partly by a smaller temporary outdoor substation, and partly by a 1,500 K.V.A. steam turbo-generator which has recently been installed in the cement company's steam plant. This steam plant supplies power at 50 cycles for the old cement plant motors. The equipment consists mainly of a 1,250 K.V.A., 3,000-volt, 50-cycle, 3-phase, A.C. generator, driven by a 1,500-h.p. horizontal compound steam engine. Boilers are equipped with superheaters, and jet condensers are used, cooling water being obtained from a nearby river.

Ultimately the whole steam plant will be discarded, and the power for the old cement plant will also be supplied by the K. M. A., through the large outdoor substation above mentioned.

As an example of the modern methods used here, a 700 K.V.A. synchronous condenser has been purchased for the purpose of raising the power factor of the load in the old cement plant. When this is in operation, not only is the power factor raised from .80 to .95, but an additional 200 K.V.A. can be supplied by the generator without increased heating.



Raw Mill and Kiln Houses

The raw materials used here in the manufacture of cement are limestone and clay and a practically unlimited supply of both exists on the company's properties at Tangshan. The top soil furnishes most of the clay needed and underneath this is found the limestone which is mined by drilling and blasting with black powder. The drilling is done partly by hand and partly by air drills supplied from an electrically driven compressor plant. A motor driven winch hauls the material to a high point of ground and from here it is taken, by gravity, in steel dump cars on narrow guage tracks, down a long slight grade to the top of the crushing plant. Here the limestone is broken up by gyratory rock crushers, and the clay by roller crushers.

Dump cars now carry the broken material to the raw mill building, and bucket elevators lift to bins at the top of the building, separate bins being provided for limestone and clay. From these it falls by gravity to horizontal revolving feeding tables. There are eight of these tables, four for limestone and four for clay. Two tables, one of each type, feed to ball mills where the first mixing and grinding is accomplished. By varying the speed of the feeding tables the amount of material leaving each table may be altered, thus varying the proportions of the mixture. Fig. 3 shows the reinforced concrete bins and feeding tables.

The ball mills are heavy boiler plate cylinders revolving on a horizontal axis. Each one contains about 8,800-lb. of steel balls which, as the mill revolves, grind the mixture into a fine powder. There are four of these mills and each is driven through direct coupled gearing by a 100-h.p., slow speed motor, which also drives one pair of feeding tables through veriable speed reduction. From the ball mills the material passes on to a final grinding in three tube mills. These are shown partly assembled in Fig. 4. They are similar to the ball mills in principle and operation but are much larger and heavier. Each mill contains about 20 tons of grinding bodies, small steel balls and cylinders, and each is driven by a 300-h.p. slow speed, direct coupled motor. With their motors, three of these tube mills mounted side by side are so heavy that they require very heavy concrete foundations.

During the whole grinding process, automatically driven samplers have been taking samples of the material. These are continually analyzed in order to maintain the proper proportions of ingredients and so insure a high and even quality of product.

In order to make cement as we know it, the materials, which up to this point are merely ground and intimately mixed together, must be calcined, or burned. This is accomplished in the kilns, of which there are two in the new plant. They are immense hollow steel cylinders over 200-ft. long, and 11-ft. in diameter, lined with fire brick. Fig. 5, showing one kiln, illustrates the manner in which they must be shipped in sections and riveted together at the plant. Set on a slight slope, on end being 7-ft. higher than the other, and supported at four points in their length by rollers, they revolve at about one revolution per minute. A temperature of about 1,500° C. is maintained in the kiln by burning powdered coal, which is blown in through a pipe at one end and ignited just as though it were a jet of oil or gas. A tall smokestack at the high end furnishes a natural draft which draws the hot gasses through the kiln. The building of these stacks was a nice piece of construction. Inasmuch as they are 200-ft. high, 16-ft. outside diameter at the base and 9.5-ft. at the top, the building of the first one in six weeks and the completing of the second in four weeks may constitute a record of its kind in China.

The raw material from the tube mills passes through an elaborate system of conveying, mixing and storing devices, and is finally fed in at the upper end of the kiln through which it slowly passes. It takes about two hours for any particle of cement to pass through, during which time it is thoroughly burned, coming out of the lower end of the kiln as "clinker." In this condition it is in small lumps and requires to be pulverized to become commercial cement. First, however, the clinker must be cooled, so it is passed through another much smaller revolving drum through which air is being forced. In cooling the clinker the air is heated to about 400° C. This hot air is of value, part of it being used to dry the coal fuel, and part being injected into the kiln to furnish air for the combustion of the powdered coal. This is an economy which well repays the cost of its accomplishment, as in this way is avoided the loss of heat incident to raising cold air to the temperature of combustion in the kiln. Each kiln is driven by a 100-h.p. direct coupled motor which also drives the fan which forces air through the clinker cooler. Although much larger than the tube mills, the kilns require much less power to drive them as they revolve so slowly.

The great length of these kilns is a feature upon which depends in great measure the whole economy of this part of the process. A careful balance must be maintained between the time which the cement remains in the kiln, the temperature of the exit gasses or products of combustion, the amount of hot air needed for combustion and the amount required for drying the fuel. The proper pro-

portioning of these factors has led to greater and greater lengths, until the economic limit has been reached in these kilns, a careful analysis showing that any further increase in length will result in a decreasing economy.

The pulverizing of the coal fuel is a separate process and is of interest in that this is one of the most economical known methods of firing. This department is equipped with drying, crushing and pulverizing machines very similar to those performing the same functions in the cement plant.

Slack coal is used and is purchased from the K.M.A. mines at Tangshan. Although of quality not well adapted for use under most boilers or for household use, it runs fairly high in calorific value, so that by using it in the powdered form it gives as good results as much more expensive coal. It is first passed through roller crushers, and then through the drying drums below the cement kilns. When quite dry it is reduced to an exceedingly fine powder in the pulverizing mills. There are three of these machines which are similar to the combined ball and tube cement finishing mills. They are 30-ft. long and 6-ft. in diameter, and each contains 11 tons of grinding bodies.

It is dangerous to store a large quantity of powdered coal as it has a tendency to explode, so it is pulverized only as needed and at the same rate that it is used. The nozzle for burning the coal dust is merely an iron pipe, projecting into one end of the kiln. The dust is forced into this pipe, by a worm screw feed, a short distance back from the end and blown through the nozzle at high speed by compressed air.

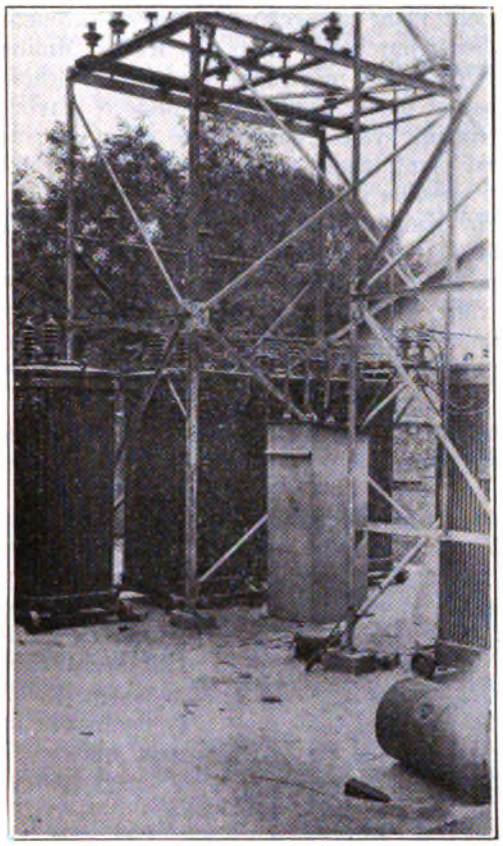
After the clinker has been cooled it is taken to the clinker sheds where it is merely piled up and allowed to stand for some time. While not absolutely necessary, it is the practice here to allow the clinker to age for about six weeks. For one thing this provides a six weeks' storage which can be heavily drawn upon in case of rush orders, and also provides a means for allowing the finishing mills to operate continuously in case of a shut down of any part of the raw materials mills.

In the finishing mill there is but one operation necessary. The clinker is passed through compound ball and tube mills. These are the latest type of finishing pulverizing machines, and consist of a tube mill and a ball mill combined in one cylinder containing about 25 tons of various grinding balls and cylinders. Three of these mills are each driven by a 300-h.p. direct coupled motor (Fig. 6.). As it comes from these mills the pulverized cement is of such fineness that all but about 12 per cent. of any mass will pass through a No. 180 sieve. This is a sieve made of very fine brass wire, having 180 meshes to the lineal inch, or about 38,000 holes to the square inch.

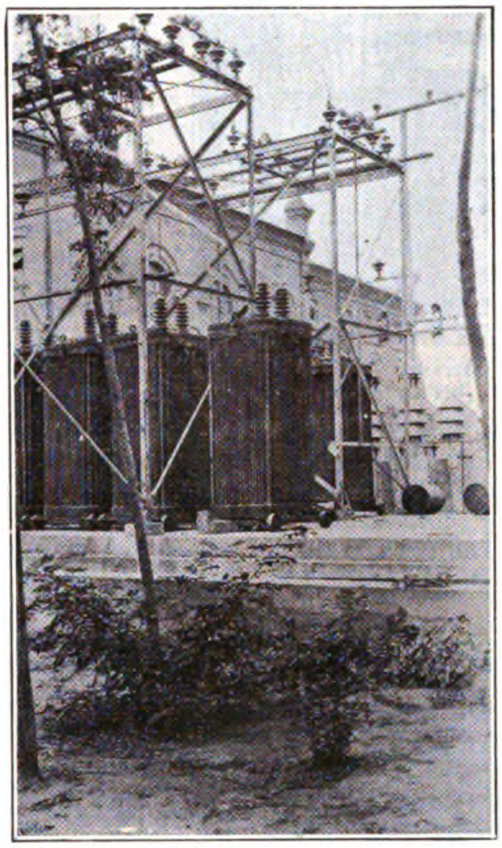
The cement is now weighed. It is taken by conveyors to scale hoppers which gradually fill until they contain exactly one barrel, or 375-lb. This charge is then automatically registered and discharged onto a traveling belt which conveys it to the stock silos. Three huge concrete silos, 56-ft. high by 52-ft. diameter, provide storage space for 60,000 barrels of finished stock. Projecting through the concrete floor of each silo into the space below are 13 spouts. A barrel is placed on a packing machine with automatic scale below a spout and cement falls into it until it contains exactly 375-lb. when a valve in the spout is automatically closed. The head is then nailed into the barrel and the cement is ready for shipment.

Filling, handling and shipping 5,000 barrels of cement every day is in itself no mean industry, as it entails the making of all of the containers used. Most of these are wooden barrels, but some iron drums are necessary for distant shipments, and some bags are used for local requirements. Side tracks from the Peking-Mukden Railway run alongside the stock houses, and when in full operation, an average of 45 loaded cars must leave the plant every day. A short run to Chinwangtao allows easy loading for ocean shipment to any part of the world. Although considerable shipments have been made to the Philippines, Java, etc., most of the cement is sold in the Chinese markets, and the company is optomistic as to the ability of China to absorb their increased output.

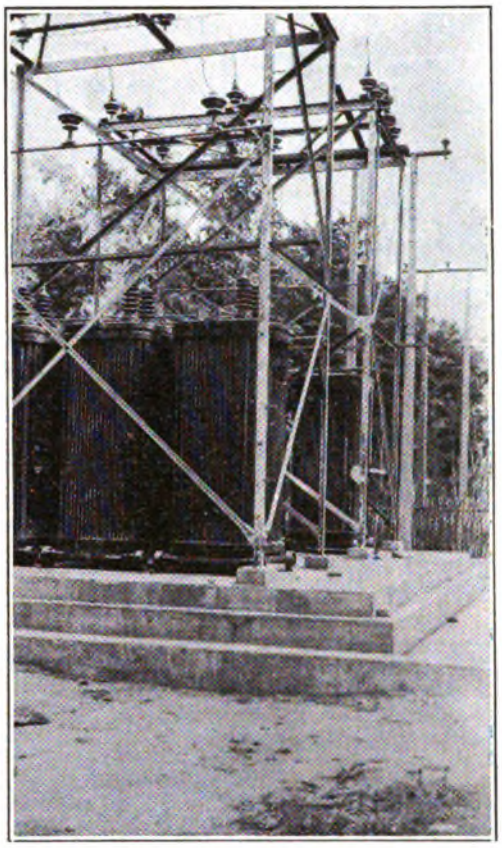
The Chee Hsin Cement Co. has at present a pay-roll of about 2,000 men, 700 of whom are at present engaged in the construction of the new plant. This number will be considerably increased upon the starting of the new plant in December or January. There have been



One 1000 K.V.A. Transformer Bank, Showing Spare Transformer and Low Tension Switch House



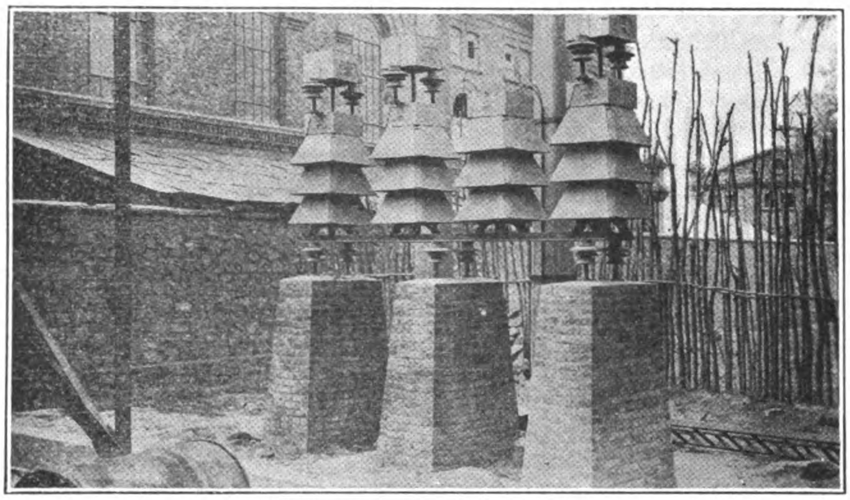
Complete Station, Showing Location of 37,000 volt Lightning Arrester



Complete Station, Showing 30,000 volt Transmission Towers

almost no labor troubles in the history of this company, and the only strike which they ever have had was not of general nature and failed on the same day it started.

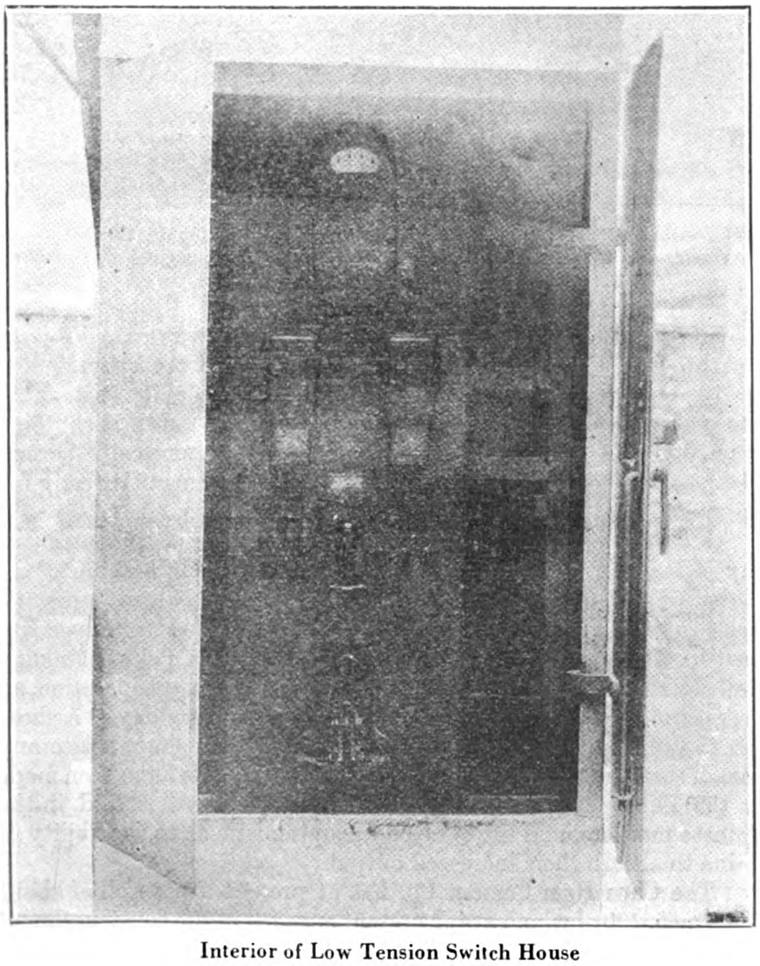
It would be difficult to imagine a cement plant with more favorable location in respect of natural advantages than this company enjoys. An unlimited supply of raw materials is directly at hand; coal is purchased practically at the mine shaft, insuring the lowest cost of fuel and generated [power; power is also purchased from the K. M. A. which operates one of the largest generating



37,000 Volt Oxide Film Lightning Arrester

systems in China, thus insuring an uninterrupted supply; shipping facilities both by rail and water are excellent; and, finally, labor is plentiful and cheap.

Some of the motors and all of the outdoor substation equipment are being built by the International General Electric Co. of America. Most of the motors and all of the cement making machinery are being built and supplied by the F. L. Smidth & Co., of Copenhagen and New York, this company having previously supplied all of the machinery for the present cement plants.



Interior of Low Tension Switch House

Outdoor Substation of the Chee Hsin Cement Company, Ltd., Tongshan

By Graham Kearney, B.Sc.

One of the most interesting electrical developments in China, in point of novelty and utility, is now almost completed at the plant of the Chee Hsin Cement Company, Ltd., at Tongshan.

The new cement plant is electrically driven throughout, the current being purchased from the Kailan Mining Administration. One of the most important factors which led to the purchase of power was the advantage of having an extensive generating system as a source of supply, as against an isolated plant, thus giving practically complete insurance against possible shut-downs from failure of the power supply. The Kailan Mining Administration furnish power from the 30,000-volt transmission line joining their generating stations at Linsi and Tongshan; power is stepped down to 2,200 volts, the operating voltage, through an outdoor transformer and switching station, consisting of two duplicate transformer and switching units of 1,000-KVA each.

Each unit consists essentially of a high-tension steel switching tower, underneath which is set a bank of three single-phase 333-KVA, 30,000-volt (star) primary, 2,200-volt (delta) secondary, 25-cycle, self-cooled, outdoor type transformers, and a 2,200-volt steel switching house. The high-tension switching and protective devices, one of which is mounted on top of each switching tower, consist each of a 35,000-volt combined disconnecting switch, choke coil, and expulsion fuse. The three elements of the disconnecting switch are operated simultaneously by means of a special mechanism, which permits of their being opened or closed by an operator standing on the ground, and so arranged that they may be locked in either position. With the disconnecting switches open, the expulsion fuses are easily reached for inspection or replacement from a wooden platform extending along the side of the tower.

The low-tension power is led from the 2,200-volt delta through special roof entrance bushings into the steel switching house: each switching house contains a standard unit slate panel, on which are mounted an automatic oil circuit breaker and a poly-phase watt-hour meter, with the necessary relays and potential and current transformers. The switch house is designed with weatherproof doors in front, which are opened for switching and metering operations, and a removeable panel at the back, for inspection and repairs. Doors and panels are provided with locking devices. The two substation units are set face to face on a concrete slab, alongside of which is built a depressed track running to the works. All of the transformers are mounted on wheels, so that in case of trouble any transformer can be quickly run on to a specially designed truck, and transferred to the shops for inspection or repairs. One spare transformer, which can be used in either unit, is kept standing by in such a position that it can quickly be run in on its own wheels to replace any one of the transformers in case of break-down.

The high-tension disconnecting switches are connected directly to the transmission line, but further protection is afforded by a disconnecting switch placed on the nearest transmission tower on each side of the substation. The transmission system from Linsi to Tongshan consists of two lines, forming a loop, so that in case of failure of either line one of the disconnecting switches in the line can be opened, and power fed through the other one only.

Protection from lightning and surges is given by a 37,000-volt oxide film lightning arrester, which again is the first of

its type to be installed in China, and represents the latest development in lightning protective equipment. This arrester is admirably suited to outdoor installations, and while it gives protection of the highest order, is not affected by climatic conditions, and requires no attention other than an occasional inspection.

The above-mentioned generating and transforming equipments are, however, still inadequate for the company's immediate power requirements, so to tide them over until the final installation is completed, the company have purchased a complete 1,500-KVA steam turbo-generator plant, which is now in course of erection. This, together with the original steam power plant, will eventually be replaced by an additional outdoor substation unit of approximately 4,000-KVA, which is now on order.

This unit will, in general, be similar to the present unit but on account of the increased capacity an automatic outdoor type 30,000-volt oil circuit breaker will be used instead of the expulsion fuses as used in the smaller units. Also, on account of the necessity of distributing the power through several feeders, one of which will feed the new Wah Sing Cotton Mill, now under construction, the 2,200-volt switching and metering equipment will be somewhat more elaborate, and will be housed in a simple brick structure close to the transformers. The leads for the transfer of power from the 2,200-volt delta to the switchboard bus bar will be placed underground.

All of the outdoor substation equipment is designed and built by the International General Electric Company, Inc., Schenectady, U.S.A., and furnished through their Agents—Messrs. Andersen, Meyer & Company, Ltd., Tientsin.

The Manila Commercial and Industrial Fair

THE Manila carnival, scheduled to take place on February 4th next, will have as its chief attraction a commercial and industrial fair to emphasize trade promotion with the other countries of the Far East. The Manila carnival has been a great annual event in the Orient for fourteen years. The daily attendance has averaged over 50,000 and visitors come from all the islands and neighboring countries. This year, the Manila business men intend to combine practical methods with pleasure and want to tell their neighbors more about the production and purchasing possibilities of the Philippines and establish better trade relations. They ask the manufacturers of China, Japan and other Eastern Asian countries, to come along with their exhibits and their order books. If they already have stocks in Manila, they say, "instruct your distributor to make a display of your goods at the carnival, or, if you have no selling connections, send an exhibit and authorize the secretary of the carnival to arrange for its display. Business awaits the far-sighted manufacturer in China and Japan who will seek an outlet in the Philippines with their 20,000,000 purchasers.

Information for Exhibitors

Approaching the main exhibition building from the grand concourse, there are on both sides thirty exhibition sites (lots 50-79) containing approximately 1,080 square feet each, for the use of exhibitors who desire to put up their own buildings. The carnival association will construct the facades without cost to exhibitors. These buildings must be completed on or before January 30, 1922.

The main exhibition building, a handsome structure designed by the carnival architect with special reference to light, air and convenience for exhibitors and visitors, provides for 104 exhibit booths (1-104) containing 100 square feet each, with wide aisle spaces and surrounding two open-air recreation courts and the sample fair theatre.

In the sample fair theatre, arrangements will be made for the exhibition of films supplied by exhibitors and for lectures explaining the films. Arrangements are being made for a merchants' convention during the fair and for a special merchants' day and merchants' ball as important features of the carnival program. Exhibitors occupying booths in the main exhibition building will be furnished janitor, watchman and usual lighting service free. Electric current for power purposes will be supplied at cost. Goods for exhibition in the commercial and industrial fair should be delivered on the carnival grounds on or before February 1st, 1922.

Applications for exhibit space in the commercial and industrial fair should be addressed to the secretary of the carnival association and should reach him on or before January 15th, 1922.

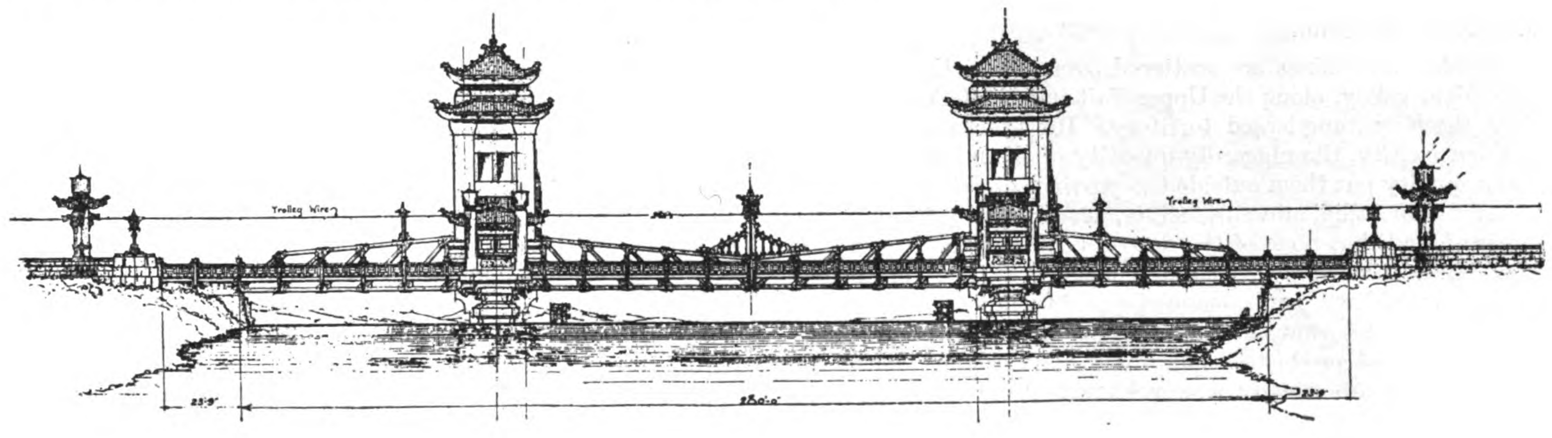
A uniform charge of $150.00 will be made for each booth in the main exhibition building and for each lot in the exhibition sites. A charge of $25.00 will be made for daily exhibition of films during the carnival. Remittance for the full amount should accompany the application and should be made payable to the secretary of the carnival association.

At the close of the commercial and industrial fair, all exhibits consigned to the secretary of the association will be stored at the expense of the exhibitor, pending his instructions.

A STRAUSS BASCULE BRIDGE FOR TIENTSIN

A BRIDGE having features of the latest Bascule type, but with pagoda-like towers and ornaments showing the traditional Chinese dragon, is being erected over the Pei Ho river at Tientsin. This bridge was designed by the Strauss Bascule Bridge Company of Chicago.

It will have a total length of 280 feet between abutments and consists of a Strauss vertical overhead counterweight double-leaf span, in the centre, 130 feet long between trunnions flanked on each side by fixed spans of 75 feet each. Designing this bridge was no easy task. The Chinese wanted the benefit of modern improvements, but everything with them had to harmonize with its surroundings. In a future issue, THE FAR EASTERN REVIEW will publish a more detailed description of this bridge.



Minerals in South Manchuria

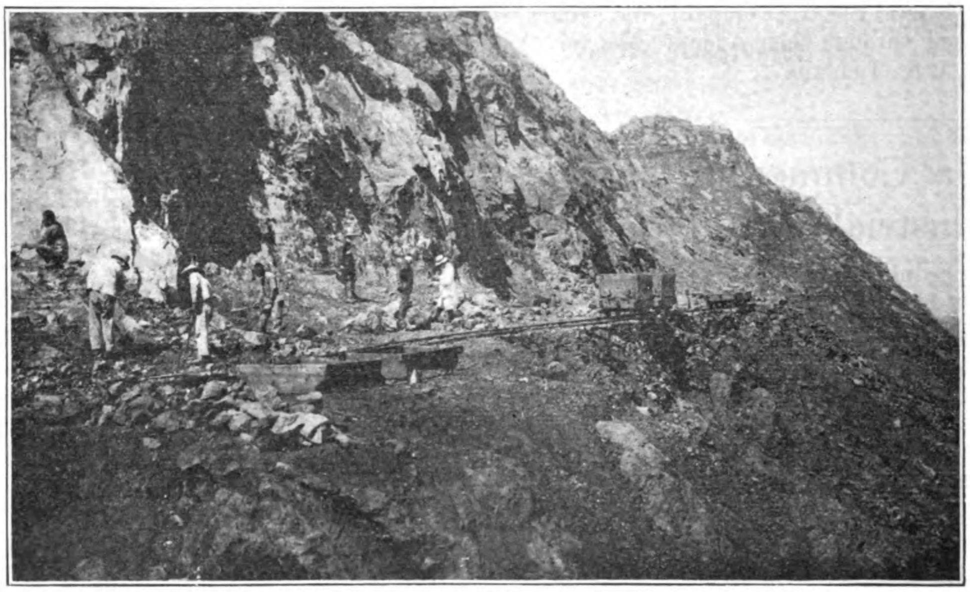
By Mr. B. TOHEIDA

THE principal mineral products of South Manchuria are gold, iron and coal. Of these that which has been worked most popularly was placer gold. But nowhere was it operated on a large scale, and there was little promise of great strikes. The best known places for these deposits are Chiapikou in the Sungari valley, belts in Tunghua and Huaijen in the valley of the Hun, a tributary of the Yalu River, Wufenglou and Wantientzu on the Upper Hun River running north of Fushun, belts in the Huifa River valley, and the valley of the Chai River flowing just north of Tiehling, in each of which places a good amount of placer gold has been gained in the past.

As gold veins, Chiapikou, Paomachuan (38 miles south of Tunghua), Hsiangluwantzu (about 12 miles southeast of North Shanchengtzu), etc., were operated vigorously at a time, but now all of them lie quite neglected.

At other places much prospecting and experimental working has been conducted, but nowhere for any length of time, and not a mine of any magnitude seems to have yet been struck.

As to iron mines, the belts about Anshan (the seat of the Anzan Iron & Steel Works of the South Manchuria Railway Company) and Kungchangling Pass, about midway between Liaoyang on the main line and Penchihu on the Mukden-Antung Line, are the principal ones. The iron ore bearing rocks of the Anshan district are wholly included in the hematite-quartz-schist, which is pre-Cambrian. The iron percentage is not high, but they are found in immense quantities. Moreover, rich ore zones giving more than 60 per cent. of iron occur here and there. At present the Anshan ores are being mined as material for the Anzan Iron & Steel Works. Next, as to Kungchangling mine, it is being prospected by the Kungchangling Iron Mining Co. organized under Sino-Japanese joint auspices. The ore for the Penchihu Colliery & Mining Co. is obtained mainly from Miaoerhkou at 25 miles southeast of Penchihu.



View of the West Anshan Iron Mine, Anshan, South Manchuria

Besides, iron mines are scattered over the northeastern part of the Yalu valley, along the Upper Taitzu east of Penchihu, and also in the Kwantung leased territory. However, want of transportation facility, the niggardly quantity of the minerals, or their inferior quality put them outside the province of extensive mining.

As for metallic minerals, silver, lead, copper, iron pyrites, etc., are found, but none of the deposits can be mined on a large scale. Their veins or seams run in irregularly varying dimensions, so much so that little can be made of any of them.

At present coal may well take the first place on the list of the principal mineral products. The names of Fushun, Yentai and Penchihu coals are already widely known. Coal in South Manchuria may be classified, according to the periods of its formation, into what belongs to the permo-carboniferous period, the jurassic period and the tertiary period. What belongs to the permo-carboniferous period is chiefly found in Liaotung Peninsula south of Fengtien (Mukden) in separate basins of small extent. The output is mostly anthracite or semi-anthracite. In many cases, a dozen or more coal seams lie overlapped one over another and are worth exploiting.

Especially, Penchihu coal has a high calorific power and is suited to the manufacture of cokes of splendid grade.

The common defect of the coals belonging to this period is that they contain sulphur and is brittle (although there are some exceptions). Then, they occur in varying thickness, which circumstance causes no small inconvenience to operation.

Next, what belongs to the jurassic period lies, in the main, in the north of South Manchuria. Takata colliery in Hsian prefecture in what is known as the Tungshan (Eastern Hill) district, to the east of Kaiyuan, may be held as representative of this class. The coal of this class contains most moisture and is the nearest approach to lignite, with a comparatively low calorific power.

That which belongs to the tertiary period occurs in the Hun valley only. Its chief exponent is the Fushun coalfield, and the others are good enough only for primitive mining by the natives.

The Fushun coal seam has an unparalleled thickness, and the coal is bituminous and rich in volatile matter. It is adapted to the production of gas and is also rich in nitrogen. Among its other characteristics, the rather high percentage of moisture and insufficient cohesion may be counted as its only shortcomings.

In regard to such minerals, as magnesite, barytes, asbestos, talc, fluor spar, fireclay, kaolin, felspar, etc. Magnesite and fire-clay are of high importance.

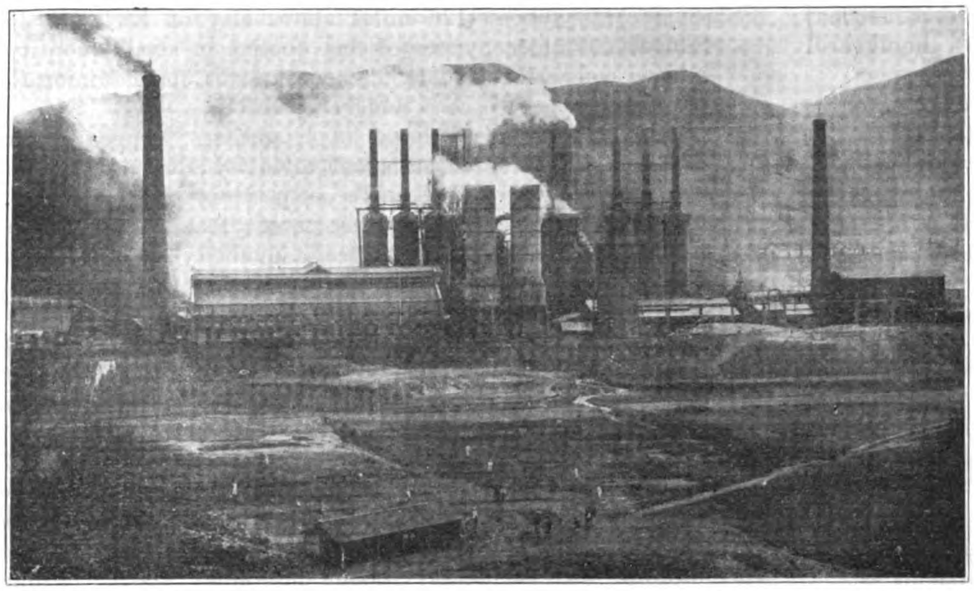
Limestone is seen at every turn almost and is used for making lime and cement.

Quartzite is distributed everywhere in Liaotung Peninsula, especially about Dairen and Ryojun (Port Arthur). At places, it may be utilized as material for the manufacture of dinas brick and glass.

Glass manufacture has been conducted at the S.M.R. Co. Ceramic Experimental Institute, Dairen, by way of experiment and with a fair measure of success.

In the line of building stone, granite, gneiss, and limestone, etc., are found, and are extensively used for architectural and earthwork purposes.

Cryptozone limestone, a kind of limestone, which has been found recently about Chinchou (near Nanshan, the battle field



at an hour's train journey from Dairen) is being used popularly for ornamental purposes.

Here follows a list where the various minerals of South Manchuria are deposited.

A. METALLIC MINERALS

(1) Iron

LOCATIONS :

YUHSIKOU (about 3 miles southwest of Tungyuanpu on the Mukden-Antung Line): magnetite of passable quality found only in a meagre quantity; mining concession held by Penchihu Colliery & Mining Co.; operation commenced in 1919, but suspended at present.

MIAOERHKOU (5 miles east of Nanfen on Mukden-Antung Line): magnetite and hematite of passable quality found in a fair quantity; mining concession held by Penchihu Colliery & Mining Co.; now under operation, daily output being about 200 tons of rich ore.

ANSHAN (about $\frac{5}{7}$ mile south of Anshan station on S. M. R. main line): magnetite and hematite of passable quality found in a considerable quantity; mining concession held by Anshan Iron Mine Chenhsing Co. under Sino-Japanese joint management, now under operation, output being supplied to Anshan Iron & Steel Works.

KUNGCHANGLING (about midway between Liaoyang on main line and Penchihu (on Mukden-Antung Line): magnetite and hematite of passable quality found in a considerable quantity; mining concession held by Kungchangling Iron Mine Co. under joint management of South Manchuria Enterprise Co. and Mr. Li Kuan-yung (chairman of Fengtien provincial assembly); prospecting in progress.

TALITZUKOU (about 13 miles southwest of Maotzushan): hematite of fine quality found but in niggardly quantity; no one holds concession to work it, it being in land under cultivation, output being supplied to native foundries near by.

CHITAOKOU (about 7 miles southeast-east of Tunghua): hematite of passable quality found in only niggardly quantity; no one holds concession to work it, it being in land under cultivation, output being supplied to native foundries near by.

KUANGTUNGTZU (15 miles north of Panshih): magnetite of passable quality found only in small quantity; mining concession held by the Hsinga foundry (a Chinese company); was mined about 1915 and output was made into iron, but venture proved failure, and work under suspension.

(2) Gold

LOCATIONS :

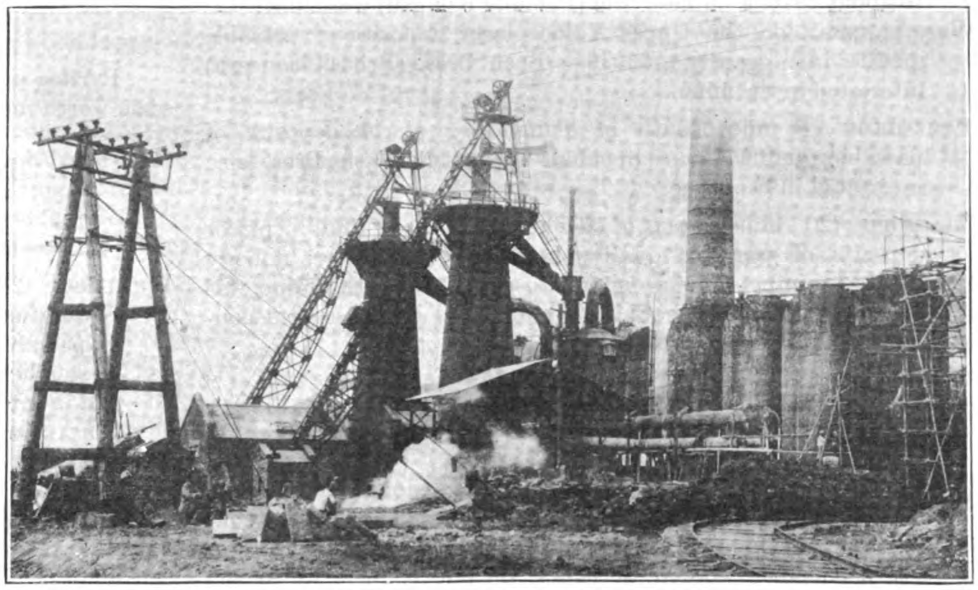
TUCHIATUN (about 18 miles southwest of Pitsuwo in northeastern corner of Kwantung leased territory): gold of indifferent quality found in small quantity; mining concession held by a Japanese of name of G. Inukai.

SUICHIATUN (between Tuchiatun and Yuanchiatun): gold of indifferent quality found iu small quantity; mining concession held by the same Japanese as above mentioned.

LAOTIEHSHAN (southern extremity of Kwantung leased territory and south of Ryojun (Port Arthur): gold and placer deposits of indifferent quality in small quantity; mining concession for gold held by Kwantung government and that for placer deposits by a Japanese named R. Horiuchi.

YUANCHIATUN (about $2\frac{1}{2}$ miles northeast of Pulantien): gold of indifferent quality in small quantity; mining concession held by a Japanese named G. Inukai; work under suspension and mine held by a Japanese named K. Toda, who financed operation.

WUFENGLOU (about 30 miles northeast of Hsingking); gold and placer deposits of indifferent quality in meagre quantity; about 1917, a Chinese firm under style of Hsingli Kungsu worked it for a time.



THREE VIEWS OF THE BLAST FURNACES AT PENCHIHU, SOUTH MANCHURIA

CHANGKANG (about midway between Antung and Kuantien): gold and placer deposits of indifferent quality in niggardly quantity.

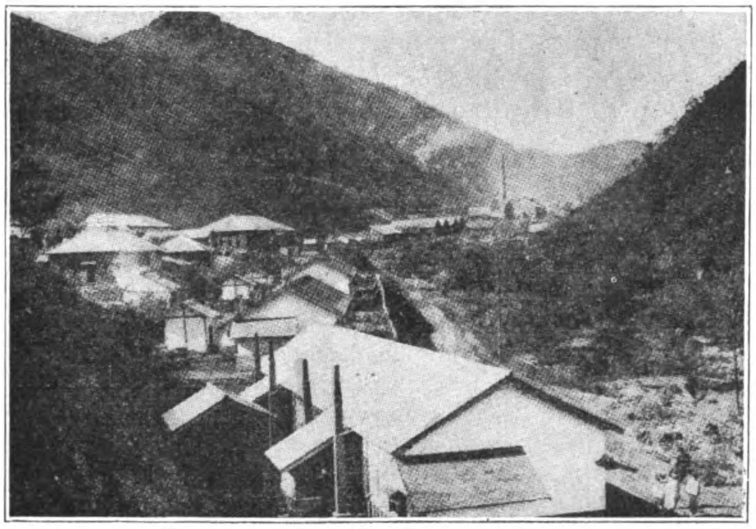
HSIANGLUWANTZU (about 12 miles southeast of North Shanchengtzu in so-called Tungshan (Eastern Hill) district: gold and alluvial deposits of passable quality found in a fair quantity; mining concession held by a Chinese concern under style of Hsingkuo Kungsu; difficult of mining after reckless operation.

PAOMACHUAN (about 38 miles south of Tunghua): gold and alluvial deposits of passable quality found in fair quantity; mining concession held by Huachang Kungsu, Chinese firm; difficult of mining after reckless operation.

CHIUPIKOU (30 miles east of city of Kirin): gold and alluvial deposits of passable quality in fair quantity; land, in which mine is located, held by an influential Koran family whose head is named Kantohkyo; difficult of mining after reckless operation.

MEICHIATUN (1.2 miles southeast of Sanshihlipu in Kwantung leased territory): placer deposits of indifferent quality found in small quantity; none holding mining concession.

CHINCHANGTUN (about 13 miles northeast of Pitsuwo): placer deposits of indifferent quality in small quantity; nobody holding mining concession.



Tienpaoshan Silver and Copper Mine, located in the Chientao district and operated by the South Manchuria Development Co.

SAMPATAN (about 7 miles east of North Shanchengtzu, above mentioned): placer deposits of passable quality found in niggardly quantity; nobody holding mining concession; up to about 1916, a Chinese firm (Paolung Kungsu) worked it.

WANGERHSHAN on the Upper Yalu, placer deposits of passable quality in niggardly quantity; Bush Bros. (British concern) interested in the mine.

TAMIAOKOU (5 miles south of Tunghua): placer deposits of passable quality found in small quantity; Bush Bros. also interested in the mine.

CHAIHOPU (20 miles east of Tiehling on main line): placer deposits of passable quality in meagre quantity; nobody holding mining concession; up to about 1914, the mine was vigorously worked by Chinese and some Japanese also concerned in working it.

(3) Copper

LOCATIONS:

TUNGKUANGLING ($1\frac{2}{3}$ miles below Antung along the Yalu): copper pyrites of fine quality found in small quantity; concession held by a Japanese named Dr. C. Uchida; mostly left neglected; worked at times, output being sold to the refinery at Chinnampo, Chosen.

PICHOUSHAOTZU (about 126 miles above city of Kirin on the Sungari): copper pyrites of fine quality in small quantity; mining concession held by Pichoushaotzu Copper Mining Co. (a Chinese concern); work under suspension.

SANTAOKOU (27 miles northeast of Kuantien): copper pyrites of fine quality found in small quantity; nobody holding mining concession; work under suspension.

PANLING (about 18 miles northeast of Tsaohokou): copper pyrites of passable quality in meagre quantity; mining concession applied for by Sino-Japanese Mining Co. under joint management.

PANSHIH (about 12 miles northeast of Mapanshan (a mountain): copper pyrites and malachite of fine quality found in meagre quantity; mining concession held by Panshih Copper Mining Co.; work under suspension.

MALUKOU (42 miles east of Penchihu): copper pyrites of passable quality found in small quantity; mining concession held by a Chinese named Pao-shen; Okura-gumi (Baron K. H. Okura, the head) holding contract of mining and selling outputs.

SUTZUHUOKO (or Tachaitzu) (about 32 miles above Tiehling on the Chai River): copper pyrites of fine quality found in small quantity; mining concession held by Kaiyuan under Sino-Japanese joint management; about 1916, Mr. K. Matsuoka of Tiehling experimentally worked it.

TIENPAOSHAN (10 miles southwest of Laotoukou, Chientao): copper pyrites and argentine of passable quality found in a fair quantity; mining concession held by the South Manchuria Development (Tahsing) Co.; work in progress; equipped with a refinery of an extensive scope.

(4) Lead

LOCATIONS:

HSIAOTIENTZUKOU (about 8 miles north-northeast of Chungku on main line): lead of fine quality found in small quantity; mining concession held by a Chinese named Hsu Ko-fang; work under suspension.

TIENNANKOU (25 miles west of Tungyuanpu on Mukden-Antung Line): lead of fine quality found in small quantity; mining concession held by Sino-Japanese Mining Co.; work in progress.

CHINGCHENGTZU (about 27 miles west of Tungyuanpu): galena and iron pyrites of fine quality found in small quantity concession held by Sino-Japanese Mining Co.; prospecting work in progress.

LAOJENKOU (about 12 miles southeast): lead of fine quality found in small quantity; concession held by nobody.

ERHPENGTIENTZU (about 12 miles southeast of Huaijen): lead of fine quality in small quantity; concession held by nobody.

(5) Iron Pyrites

Pyrites occur at several places, but nowhere it is found on a scale worth mentioning.

B. NON-METALLIFEROUS MINERALS

(1) Coal

LOCATIONS:

WUHUTSUI (23 miles west of Pulantien on northern border of Kwangtung leased territory): semi-anthracite, non-caking, of passable quality found in meagre quantity; mining concession held by a Russian, from whom Tayih Kungsu has leased, and it is under exploitation.

TUNGCHIAKOU (15 miles northeast-east of Chinchou): semi-anthracite, non-caking, of indifferent quality found in meagre quantity; concession held by Mr. Kimizuka, a Japanese; work under suspension.

TSOTZUYAO (2 miles east of Wafangtien station): bituminous coal, non-caking, of indifferent quality found in small quantity concession held by South Manchuria Railway Company.

FUSHUN (end of Fushun branch line): bituminous coal, slightly caking, of fine quality found in inmense quantities; concession held by South Manchuria Railway Co.

Outside Fushun mining area, there are Talien colliery, concession for which is held by South Manchuria Development (Tahsing) Co., and operated Oriental Coal & Mining Co. which also acts as sales agent; Achinkou colliery (concession for which is held by Chouwenkuei, resident of Dairen); Piaoerhtun colliery (concession for which is held by Junhsing Kungsu and Nanchang Yoko,

YENTAI (9 miles east of Yentai on main line): semi-anthracite coal non-caking, of passable quality found in fair quantity; concession held by South Manchuria Railway Co.; under operation.

Outside the company's mining area, there is Weimingshan colliery, concession for which is held by Tienli Kungsu, daily output being about 100 tons.

PENCHIHU (close to Penchihu station on Mukden-Antung Line): semi-anthracite coal, caking, of fine quality found in fair quantity; concession held by Penchihu Colliery & Mining Co.; under operation.

NIUHSINTAI (10 miles east of Penchihu): anthracite coal of passable quality found in fair quantity.

Concession for eastern district held by Tsaiho Kungsu, a Sino-Japanese company; western district, which is Chinese mining area, is worked by a Japanese concern; Yuhsin Kungsu, which also acts as sales agent for output.

HSIAOSHIH (40 miles above Penchihu on the Taitzu River): semi-anthracite coal, non-caking, of passable quality found in fair quantity; nobody holds concession to work it.

SAIMACHI (53 miles southeast of Penchihu): semi-anthracite coal, caking, of passable quality found in meagre quantity; concession held by Shuanghoyu Colliery Co., which is under contract with Oriental Coal & Mining Co., the latter working it and selling output; worked in native fashsin.

TIENSHIHFUKOU (55 miles east Penchihu): anthracite and semi-anthracite, slightly caking, of fine quality found in fair quantity; concession held by Fuhua Kungsu and three individuals, who have given contract to Penchihu Colliery & Mining Co. to work it and sell its outputs; operated on native method and output sold locally.

TATAISHAN (1½ miles northwest of Tiehling): lignite, non-caking, of passable quality found in small quantity; concession held by Huasheng Kungsu; work under suspension.

ILU (nearly 2½ miles east of Hsintaitzu station on main line): lignite, non-caking, of passable quality found in small quantity; nobody holds working concession. Formerly Aishang Kungsu (a Japanese concern) was interested in it.

SHAHOTZU (nearly 4 miles northeast of Changtzu): lignite, non-caking, of passable quality found in meagre quantity; concession held by Tunghsing Mining Co. (under Sino-Japanese management).

TAKATA (1½ miles north of Takata in Tungshan (Eastern Hill) district): lignite, slightly caking, of fine quality found in fair quantity; concessions held severally by Paohsing Kungsu, Fukuo Kungsu, Yuhsing Kungsu, Tacheng Kungsu, Yuhua Kungsu and Chuanyi Kungsu. Moreover three applications for mining is on file; total annual output placed at about 60,000 tons.

TAOLU (several collieries located at about 8 to 15 miles north of town of Taolu): lignite, slightly caking, of fine quality found in fair quantity; that part called Yatzuchuan operated by Tiencheng Kungsu and Mingshengfeng, concessionaires. Tapingling worked by Futai Kungsu; and Hsiao Lishuhotzu operated by Fengpei and Fengtung Kungsu; under operation on native method; total annual output, about 10,000 tons.

SHANSUNGKANG (23 miles southeast of Chaoyangchen): semi-anthracite of passable quality found in meagre quantity; mining concession held by Tahsingyao and thirteen others; mining work under suspension.

PANCHIEHKOU (30 miles north-northeast of Liuho); semi-anthracite of passable quality found in small quantity; nobody holds mining concession.

HSIENJENKOU (13 miles south-southeast of Liuho): semi-anthracite, caking, of passable quality found in small quantity; no one holds mining concession.

TIENHOTUN (8 miles southwest of Kuantien): semi-anthracite, caking, of passable quality found in fair quantity; concession under application by R. Minehata (a Japanese) and Li Hsien-hsien (a Chinese).

WULUNGTUN (67 miles south-southeast of Kirin): lignite, non-caking, of fine quality found in fair quantity; mining concession held by a Chinese concern named Tehsing Kungsu; work under suspension.

TIEHCHANG (20 miles northeast-east of Tunghua): semi-anthracite, caking, of fine quality found in meagre quantity; concession held by Paotai Kangsu and others; worked in native style.

KANGYAO (33 miles north-northeast of Kirin): lignite, non-caking, of indifferent quality found in fair quantity; under joint management of Liu-tungkang (a Chinese) and J. Uchigaki (a Japanese); worked in native style, the total annual output being only 200 tons.

HUASHIHLING (2⅜ miles north of Yingchengtzu on Kirin-Changchun Railway): lignite, non-caking, of passable quality found in fair quantity; concession held by Paochi Mining Co. (a Chinese concern); daily output between 20 and 30 tons.

KWANCHENGTZU: (1) Shihpeiling, about 9 miles east of Changchun; (2) Taochiatun, about 13 miles southeast of Changchun: lignite, partially caking, of passable quality found in fair quantity; concession held by South Manchuria Railway Company; Shihpeiling colliery under operation by South Manchuria Mining Co.

SHANSUNGPEI in Chientao (20 miles north of Kwainei, the terminus of the proposed Kirin-Kwainei Railway): lignite, partially bituminous, of inferior quality found in meagre quantity; concession held by Huasheng Kungsu (a Chinese firm); work under suspension.

LAOTOUKOU in Chientao (about 15 miles west of Chutzukai): lignite, non-caking, of passable quality found in fair quantity; concession held by South Manchuria Development Co.; Yenchi Mining Co. (Chinese) and a few others worked it in native fashion.

TAYAOKOU (30 miles southwest of Chinchow this side Shanhaikwan, accessible by a light rail line laid by Tungyu Kungsu (a Chinese firm) from Nuerhho station on Peking-Mukden Line of Chinese government railways): bituminous coal, non-caking, of fine quality found in meagre quantity; concession held by Chinhsi Colliery Co. under Sino-Japanese joint management; under operation, daily output being about 80 tons.

HUNGLOHSIEN (15 miles southwest of Chinchow this side Shanhaikwan): semi-anthracite, non-caking, of passable quality found in meagre-quantity; concession held by Aishang Co. and a few others; worked in native fashion.

NUANGTITANG (25 miles southwest of Chinchow this side Shanhaikwan, the major portion of the mine belonging to Chaoyang prefecture): semi-anthracite, non-caking, of passable quality found in meagre quantity; concession held by the Peking-Mukden Line of Chinese government railways; under operation by natives who have leased it.

HSINCHIU (46 miles northwest of Lichiawopeng on Peking-Mukden Line of Chinese Government Railways): lignite, non-caking, of fine quality found in fair quantity; concession held by Tahsin Kungsu, Tahsing Kungsu, etc.; modern mining equipments being planned to be installed; besides, there are a few pits worked in native fashion, yielding about 160 tons daily.

(2) Magnesite

CHUANSHANTZU (2 miles due north of Shakang on main line): of fine quality found in fair quantity; concession held by Anshan Chenhsing Co. (under Sino-Japanese management), South Manchuria Railway Company, too, being interested.

PAIHUSHAN (about 3 miles due south of Tashihchiao): of fine quality found in fair quantity; concession held by Chenhsing Co., S.M.R. Co., too, being interested.

KUANMASHAN (3½ miles east of Tashihchiao): of fine quality found in large quantity; concession held by Ho Chang-ching; worked at times.

NEAR TALING (4⅝ miles northeast of Tashihchiao): of fine quality found in large quantity; concession held by Yu Chung-han (a Chinese), S.M.R. Co., too, being interested.

NEAR HUASHIHCHIN (about from 9 to 14 miles southwest of Haicheng on main line): of fine quality found in large quantity; concession held by Yu Chung-han, S.M.R. Co., too, being interested.

CHINMAKU (from 12 to 14 miles south-southeast of Haicheng): of fine quality found in large quantity; concession held by Yu Chung-han, S.M.R Co., too, being interested.

(3) Dolomite; (4) Limestone; (5) Quartzite

The three kinds of rocks above mentioned being widely distributed in a large variety in South Manchuria, any of them may be obtainable without difficulty, if sought in the right quarter.

(6) Clay

YENTAI (running parallel to Yentai coal seam): fire clay of fine quality found in fair quantity; concession held by South Manchuria Railway Company; under operation.

WUHUTSUI (being located within Wuhutsui coal field, 30 miles southeast of Fuchou): refractory clay of fine qua'ity found in fair quantity; concession held by Yiho Clay Co., Tatung China-clay Co., and Tungyi Pottery Co. (all Chinese), in all of which S.M.R. Co., too, is interested more or less; work under suspension.

TUMENLING (⅝ mile north of Tumenling station on Kirin-Changchun Railway): porcelain clay of fine quality found in fair quantity; investigation in progress.

(7) Asbestos

HOSHANGTUN (about 5 miles east of Chinchou in Kwantung leased territory): of fine quality found in small quantity; concession held by Japan Asbestos Co.; work under suspension.

TAHUANGKOU (1 mile northwest of Tahuangkou in Kuantien prefecture): of fine quality found in meagre quantity.

(8) Fluorite

LUCHIATUN (5 miles south-southeast of Luchiatun in Kaiping prefecture): of fine quality found in meagre quantity; concession held by a Chinese; Shimakyu, Druggists, Dairen, acting as sales agent.

TSUICHIATUN (3½ miles west of Luchiatun): of fine quality found in meagre quantity; concession held by a Chinese; Shimakyu, Dairen, acting as sales agent.

LAOMUKOU (6⅝ miles south of Haicheng station on main line): of fine quality found in small quantity; concession held by Kungy Kungsu, Haicheng; work under suspension.

(9) Talc

SUNGCHIAPUTZU (10⅝ miles south of Haicheng on main line): of fine quality found in fair quantity; mining concession held by Yu Chung-han, S.M.R. Co., too, being interested; worked at times.

CHINGTZUKU (about 8 miles over the hills, and about 18 miles over the cart road, south of Haicheng): of passable quality found in fair quantity: mining concession held by Yu Chung-han, S.M.R. Co., too, interested.

MAKU (14 miles south of Haicheng and situated opposite Huashihling); of fine quality found in fair quantity; concession held by Yu Chung-han, S.M.R. Co., too, being interested.

(10) Felspar

LIENCHIAKOU (2½ miles east of Shihho in Kwantung leased territory): of fine quality found in meagre quantity; no no one holds mining concession.

SHIHTASHAN (6⅝ miles south southeast of Haicheng): of passable quality found in fair quantity; concession held by Chenhsing Kungsu; output under experimental use at Ceramic Experimental Institute of S.M.R. Co.

(11) Soda

NEAR TSITSIHAR (in the Nen valley east of Tsitsihar): of fair quality; no reliable estimate obtainable as to its quantity; nobody holds concession.

PALISHAN (in Wentu principality and belongs to Chengchiatun in Liaoyuan prefecture): of passable quality; no reliable estimate obtainable as to its quantity; concession held by no one.

TAPUSU (in South Kuoerhlossu, about 53 miles and southeast of Taonan): of passable quality; no reliable estimate obtainable as to its quantity; concession held by no one.

National Development Commission, Philippines

THE creation of a "National Development Committee," composed of the director of public works, director of agriculture, director of lands, director of forestry, and director of science, for the purpose of making an extensive and detailed study of the natural resources of the Philippines and recommending from time to time steps for their development, is the aim of a bill introduced at a recent session of the Philippine senate.

The duties of the committee as set forth in the bill are as follow:

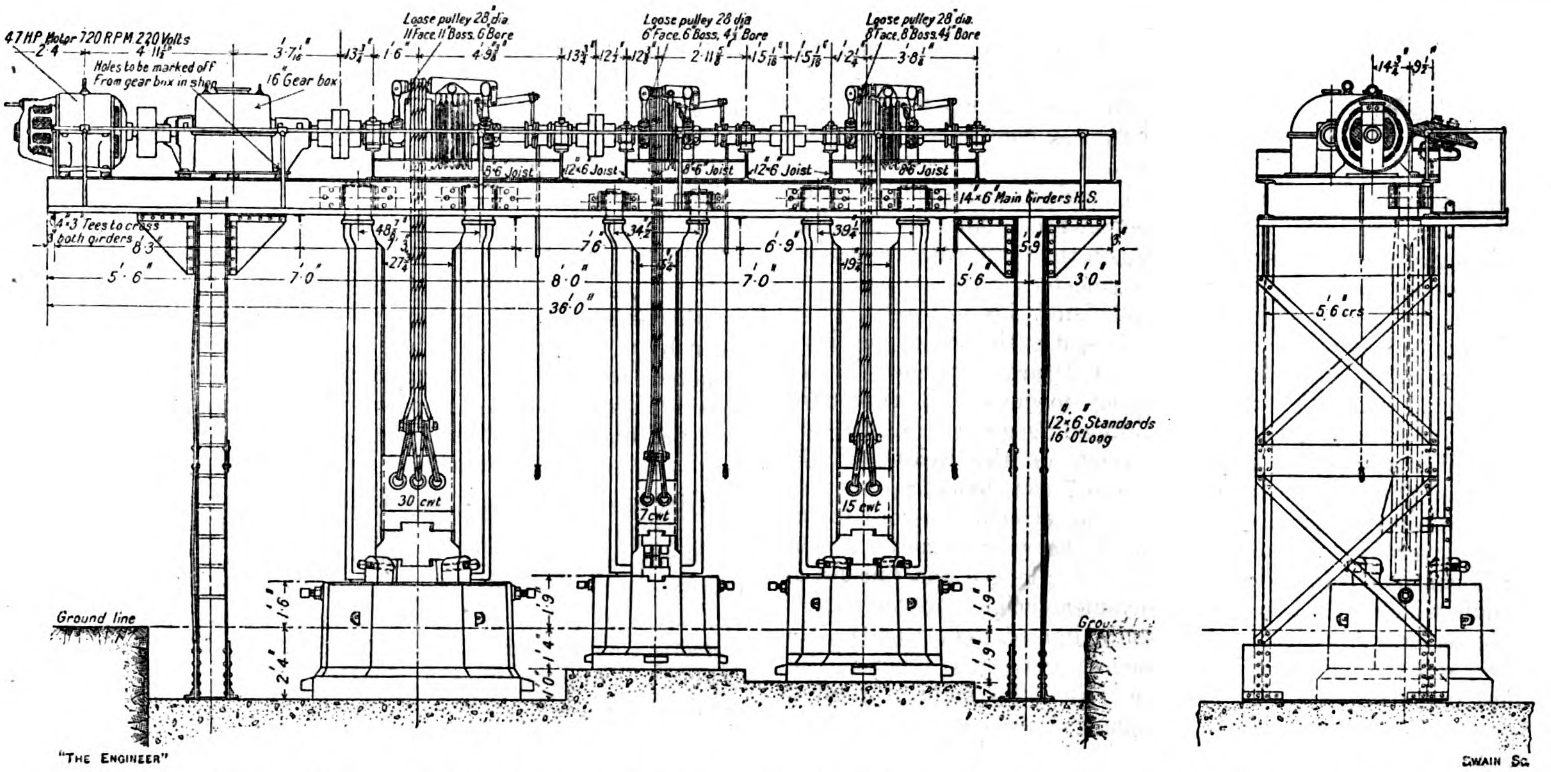
"(*a*) To explore, investigate, and make all necessary inquiries of the various natural resources of the islands so that the inversion of capital for the exploitation of these resources may be made advantageous.

"(*b*) To investigate, make an estimate of necessary expenditure, and make all necessary inquiries for the establishment of intercommunication between the various important points of Mindanao, especially the provinces of Agusan, Bukidnon, Cotabato, Davao and Lanao.

"(*c*) Explore, investigate and make all necessary inquiries in regard to the abundant mineral deposits in the islands.

"(*d*) Investigate and make a study of rivers and falls and cascades, determine their force, radius of action and the possibility of their being utilized as motive power for railroads, electric cars, electric plants and other industrial enterprises."

The committee is to be under the control of the department of agriculture and natural resources, and is to be presided over by the director of public works who is authorized to employ all technical personnel necessary fr the committee's work. The committee is to act for three years or until new ones or the same members are appointed. The sum of P40,000 is appropriated from the insular treasury for its expenses for 1922.

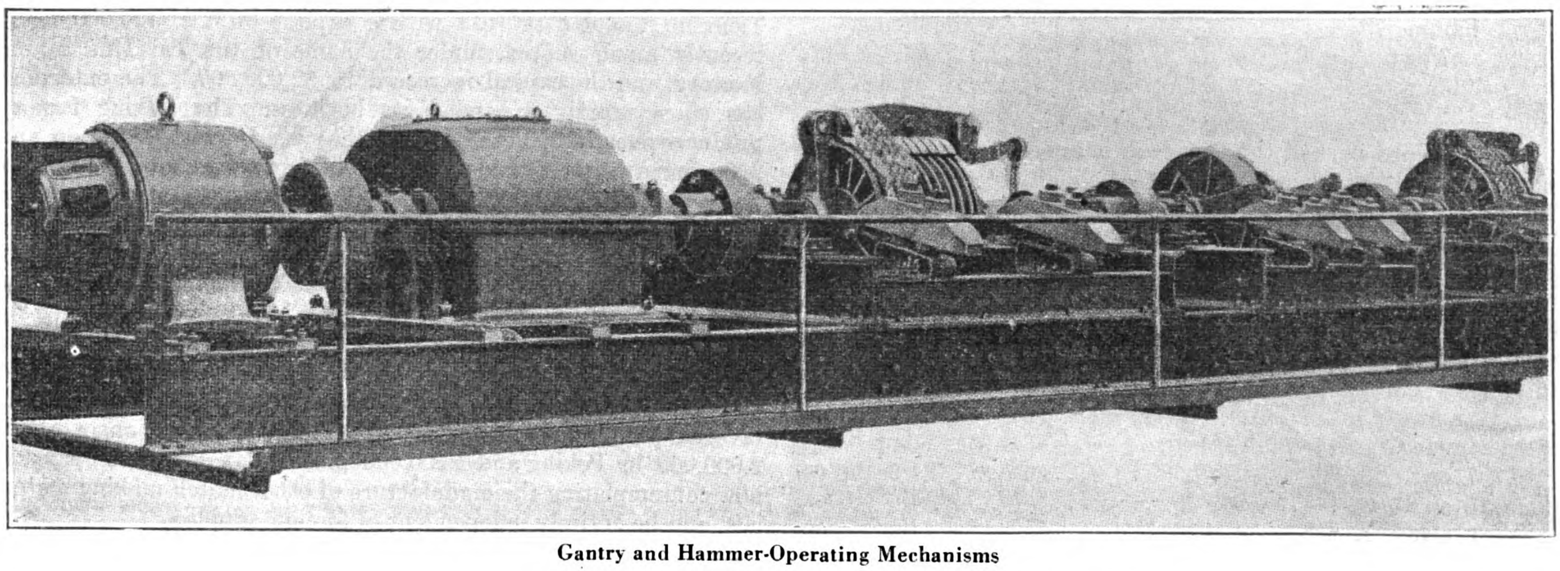


Electrically Operated Battery of Drop Hammers, manufactured by Brett's Patent Lifter Company, Ltd., of Coventry, England, supplied to the Tangshan Works of the Peking-Mukden Railway by Messrs. J. Whittall & Co., Ltd.

Drop-Hammer Battery for Tangshan Shops

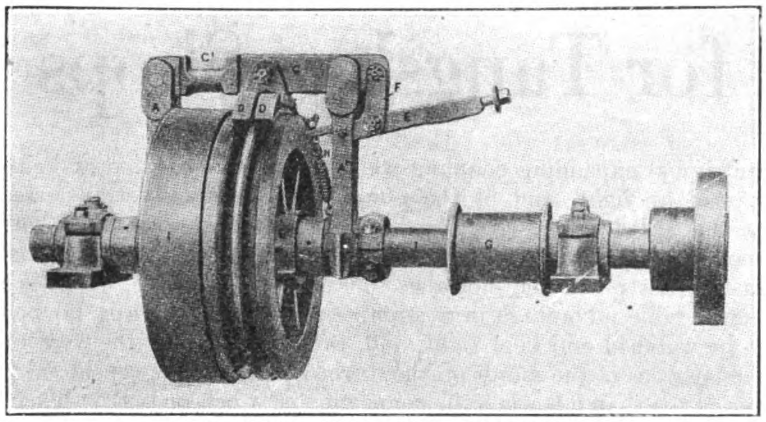
AN electrically-driven battery of three drop hammers has recently been completed to the order of J. Whittall & Co., Limited, by Brett's Patent Lifter Company, Limited, of Coventry. The battery, which is shown above, consists of a 30 cwt. and a 15 cwt. hammer for die work, with a 7 cwt. hammer, placed in between, fitted with roughing out or forming tools to act as a dummying hammer for the two larger sizes. It is intended for use in the engineering shops of the Peking-Mukden Railway.

As will be seen below, which shows the actuating mechanism of the hammers, the three lifters are mounted on a common shaft, which is built up in three sections with steel couplings, and is driven through double-reduction gearing, which is enclosed in an oil bath, an electric motor providing the motive power. The connection between the motor and gear-box takes the form of a centrifugal expanding coupling which permits of the motor being started up light, and of the power being gradually transferred as the speed increases. The makers point out that there are many advantages of such form of drive over the usual belt method. In the first place, the motor occupies no ground space, which is a considerable advantage in a stamp shop. Then there is no belt to be watched and kept tight, and, furthermore, that the wear on the bearings of the motor on the direct drive must be considerably more even than it is when the connection is by belt on to a fly-wheel. The gear wheels have machine-cut double helical wheels which run in an oil bath, and work with practically no noise when the plant is in operation. The enclosed gear-box has, of course, many advantages over open gears, especially when they have to work on a gantry which, under the load of the lifting hammers invariably springs, with the result that an even meshing effect is practically impossible.



Gantry and Hammer-Operating Mechanisms

The lifter now employed by Messrs. Brett is an improvement of the mechanism formerly used. It will be seen from the illustration below, that the appliance is actually very simple. The working of it is as follows: The steel grooved drum B is firmly keyed on to the shaft J, and rotates continuously with it. The pulley I at the side is loose on the shaft, and the rope connected to the shoulder C[1] of the shackle C and which supports the hammer tup rests on this pulley in the ordinary way. The two lifting levers A. A[1] are also loose on the shaft, and are bushed with phosphor-bronze. They are connected at the top by the shackle C, which is pivoted on the left-hand side to the top of A, but is free to move up and down in the slot at the top of the right-hand lever A[1]. The friction blocks D, D are suspended for the shackle, and when the latter is pulled downwards it causes the friction blocks to engage with corresponding grooves in the steel drum. The number of grooves depends on the weight of the tup. The 30 cwt. hammer has six, the 7 cwt. hammer only one. The motion of the shackle is obtained by attaching a cord to the control lever E, and coiling it round the winch drum G. The cord is continued downwards to a suitable length and finishes at a handle which is arranged at a convenient height for the hand of the operator. A pull on the handle immediately engages the brakes, and the hammer rises; when the tension is taken off the brakes are released and the hammer falls. So far as the effort necessary was required, a child of tender years could easily have done what was required. The releasing of the brakes is effected by the action of the adjustable spring H. A practical feature of this lifter is that it gives an absolute control of the tup.



Latest Type of Brett Lifter Mechanism

The hammer can be lifted to any height and allowed to fall, or it can be suspended in the rods at any point and held perfectly stationary.

Following a test with recording ammeters, the three hammers were tested in rotation, and the following results were obtained:—

Weight of hammer.	Horse-power absorbed while lifting.
7 cwt.	24.1
15 cwt.	49.6
30 cwt.	83.14

In the third part of the test each hammer was, in turn, kept suspended, and the power to effect that condition was ascertained. This portion of the trial is, perhaps, the most interesting of the whole. There was no driver working the hammer, but to take the place of the pull of an operator a small weight was suspended from the end of the working cord, washers being added so as to give just the amount of weight required to cause the hammer to rise and remain in the rods. All the hammers were treated in this way individually, and the power absorbed was as follows:

Weight of hammer.	Horse-power absorbed.	Weight on handle.
7 cwt.	14.75	1-lb. 11 oz.
15 cwt.	26.82	2-lb. 8 oz.
30 cwt.	42.91	3-lb. 3 oz.

In the next test two of the three hammers were operated together, with the following results:—

	Power absorbed.
(*a*) 15 cwt. and 7 cwt. hammers working together	53.64
(*b*) 30 cwt. and 7 cwt. hammers working together	84.4
(*c*) 30 cwt. and 15 cwt. hammers working together	107.28

In this case there was a driver to each hammer, and both hammers were worked as in actual service.

The final test consisted in having all three hammers suspended together, with weights tied on to the handle. The actual power taken by the motor under this test was 75 horse-power. It is to be noted that under this equilibrium test—where the hammer is suspended in the rods—the power taken to drive is less than that absorbed under tests Nos. 2 and 4, that is to say, it is less than the power taken while hammers were being lifted.

Messrs. Brett point out that this last equilibrium test was very searching, for if there had been the slightest tendency for the lifters to overheat it would at once have become apparent. They assure us, says *The Engineer*, however, that, as a matter of fact, after all the above tests had been taken the mechanism was perfectly cool throughout, and they remark that the fact that it was so goes to disprove the theory that an external cooling device should be an essential feature of drop-hammer lifters. It should, however, be remarked that with this form of lifter the drums are continuously rotating in the air, which naturally has a cooling effect. We believe we are right in saying that no drop hammer had ever before been subjected to an equilibrium test of this character.

No particular comment is necessary on the general construction of the hammers, which conform to the general practice introduced by this firm many years ago. We may, however, remark that, whereas the brakes of Messrs. Brett's lifters used to be of phosphor-bronze, they are now made of a special material which has been invented by Mr. Herbert Froode, of Ferodo, Limited. The material is not, we understand, on the market in the ordinary way, but is made specially for Messrs. Brett, who state that it gives an excellent friction surface. The base blocks of the hammers are of cast iron, and they are of massive construction, being about fifteen times the weight of the tup. The overhead work is supported by strongly riveted steel girders, and the whole of the structure throughout is on ample and heavy lines. As is well known, there is no class of appliance which receives more severe punishment than a drop forging installation, and that fact is evidently kept well in view by Messrs. Brett.

Largest Match Factory in North China

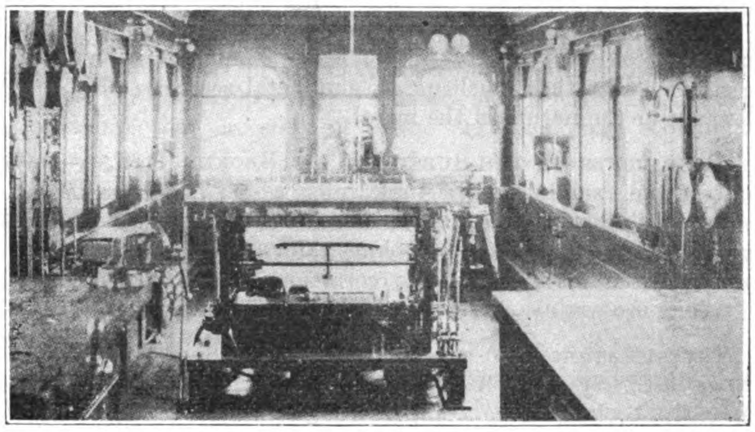
The Tai Feng Match Factory, Peking, founded in 1906 with a capital of $120,000, and the Hua Chong Match Factory, Tientsin, founded in 1911 with a capital of Tls. 100,000, were recently amalgamated, under the name of the Tai Hua Match Factory, and the capital increased to $2,000,000. The enterprise has since rapidly expanded its business. The Peking factory produces over 25,000 cases of matches yearly, with 300 men and 200 women workers, and the Tientsin factory about 16,000 cases yearly with 700 men and 60 women workers. The output is valued at $1,000,000. At the expiration of the patent right on 1919, the government granted a renewal for a further period of fifteen years, expiring in 1934. Soon after, branch factory devoted solely to the manufacture of match-sticks (which had been entirely supplied by foreign producers) was established at Antung where material is abundant.

The capacity of the factories is steadily increasing due to its favored position as the sole supplier for a population of about 2,000,000 in Peking and 1,500,000 in Tientsin. The company is now contemplating the manufacture of other match-making materials, and be entirely independent of foreign supplies.

Railway Research Work in Japan

TESTS and experiments on railway materials are in charge of the railway research office in the president's secretariat, Tokyo, and the office comprises the first and the second laboratory and the locomotive testing plant. The office also has charge of the district laboratories.

Technical tests and research work in the Japanese railways date back from April 1883 when simple testing was first carried out on cement purchased for railway use. On the nationalization of the private railways in 1907, a laboratory was established on the basis of the cement testing office in order to attend not only to the tests of strength and durability, but also to the chemical experiments on cement, volcanic ash, bricks and other kinds of materials. Both in 1910 and 1913 the scope of the work was enlarged and made to include fuels, paint, oils and all kinds of purchases for railway use, and further to cover the whole field of research on railway materials. At present the railway laboratory ranks, in point of equipment, scope of work, and efficiency, among the leading technical institutions in Japan.



Interior View of Dynamometer Car

The physical tests, chiefly on iron, steel and wood for rolling stock, that had been carried out prior to 1910 in the district workshops, were transferred first to the railway laboratory and subsequently to the charge of the railway research office, which had been improved in equipment and enlarged in scope.

The trial burning of coal is another important work undertaken by the office, a special plant for this purpose having been installed in 1913. The plant is of the same pattern as that sent by the Pennsylvania Railroad Company to the Louisiana Purchase Exhibition in 1910.

The work of finding possible substitutes for the Japanese chestnut timber, which forms the bulk of the railway sleepers used in our country, has been carried on since 1913 at the railway research office. In this laboratory creosoting and micrological testing rooms were newly equipped, so that, besides physical and chemical tests and experiments, micrological experiments were commenced not only on railway sleepers, but on timbers in general and, further, on some food stuffs that are apt to putrefy while in the train.

Lastly, it was decided in December 1916 to provide equipment for researches in electricity. The building has already been finished, and machines and other equipments are on the point of being installed.

Chemical Tests

EQUIPMENT.—The laboratory consists of twelve rooms as enumerated: (1) Cement strength testing room; (2) room for chemical analysis of iron and steel; (3) room for chemical and vacuum tests on the strength of rubber-wares; (4) gas generating room; (5) room for balances; (6) cement analyzing room; (7) room for chemical testing of rubber; (8) room for chemical testing of elastic rubber material and cloth; (9) room for chemical analysis of water and fuel; (10) room for chemical analysis of paints; (11) room for chemical analysis of oils and fats; (12) metal analysis room.

Materials subject to tests and analysis are as follows: (1) Materials for construction; (2) metals; (3) paints; (4) oils; (5) fuel; (6) rubber materials; (7) cloth.

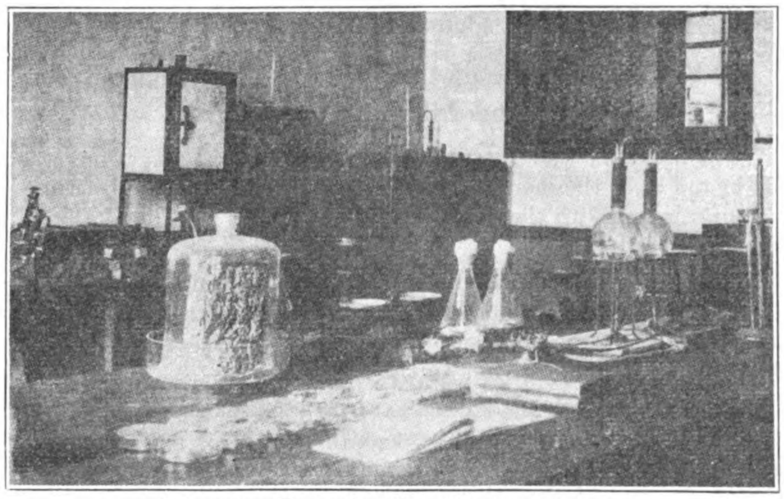
Some of the chemical tests that may interest the public are summarized as follows :—

THE INDUSTRIAL APPLICATION OF JAPANESE LACQUER.—Japanese lacquer has long been recognized as one of the hardest and most durable kinds of varnish, and, but for the fact that it takes too long to dry, and, further, that the color obtainable thereby is rather monotonous, it would have been used more extensively for industrial purposes. After years of research at the laboratory, a suitable dryer has been discovered and the way has opened for the wide industrial application of this material. At present oil paints are being gradually replaced by lacquer, which is far harder in texture. Lacquer has also been found good as a pigment, and the field of the economic use of this juice has been considerably enlarged.

PETROLEUM FOR LIGHTING PURPOSES.—As a result of comparative investigations it was found that the Japanese light oils, if special mouthpieces be fitted to signal lamps, can be used as substitutes for mineral or colza oil, the light lasting from 12 to 36 hours.

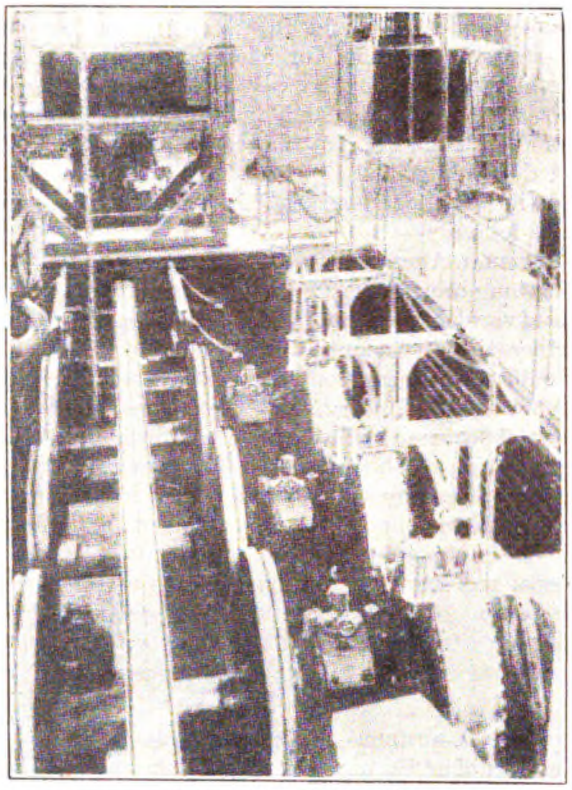
TEST ON INDIA-RUBBER.—To prevent deterioration in the quality of india-rubber by oxydation or other causes, it was ascertained that oxysalt is the best mineral compound to mix with raw rubber. Though it is not yet possible to arrive at a final conclusion, the best way to preserve rubber seems to be to stow it away in a place from which the light and dry air are excluded, and moreover, to keep it as far as possible at a suitable degree of moisture and under uniform temperature.

SILICATE COTTON.—To prove the dictum of a certain American expert that the waterproof power of concrete could be strengthened by mixing heavy oil with it, tests were conducted on this matter, but the result showed that, though the water-proof power could be increased, much of the strength of the cement was lost. Among other suitable water-proofing agents, silicate cotton was said to be most effective. This material was also tested, and the result showed that it could prevent some of the penetrability of water.



Laboratory Room for Wood-Destroying Fungi

Efflorescence of Bricks.—Investigations into the cause of the efflorescence much in evidence at cracks in brick structures, confirmed the assumption that the incrustation is largely responsible for the premature decay of the structures, the fact being revealed that the surface of bricks is spoiled by the action of the efflorescence which appears thereon, and which, in turn, tends to hasten the internal decay of the bricks. It was found that the best preventive of efflorescence was to minimize the amount of moisture absorbed in the substance of the bricks.



Locomotive Testing Plant

Preventive Against Rust.—Researches were made into the cause of the growth of rust as well as into measures for its prevention. It was ascertained that among many preventives, such as lacquer, red lead, asphaltic paints, etc., asphaltic paint is the most effective, though hitherto its use for this purpose had been neglected.

Physical Tests

Equipment.—The chief operating rooms comprise: (1) room for testing materials; (2) fire-work room; (3) microscopical examination room; (4) room for preparing specimens for micro-examination; (5) dark room for developing photographs; (6) machine-tool room; (7) grinding and shaping room; (8) forging and casting room.

Results of Some of the Principal Researches and Investigations

Researches on Train Lighting.—An investigation was conducted as to the merits of coal, gas and acetylene as substitutes for pintsch gas, with the result that pintsch gas was found a little superior to any other.

Comparative Testing of Rails.—As the result of thorough tests carried out on rails made by the government iron foundry and on those of the Carnegie Company, it was ascertained that the former were not inferior to the latter.

Signs of Breaking of Tyres and the Preventive Measures Adopted.—With a view to investigating means of preventing the breaking of tyres, technical trials were conducted on various tyres. The result showed that there were three stages in tyre-breaking and that, if proper measures were taken at the first stage or at the beginning of the second stage of breaking, the fracture could be prevented.

Investigation into the Explosion of an Engine.—With a view to tracing the cause of the engine explosion, which took place on the Echigo Railway Company's line, the boiler barrel plate of the exploded engine was examined, and it was ascertained that the disaster was due to flaws on the surface of the plate, for which the defective forms of the joints and the improper use of material were responsible.

Research on the Cracking of a Fire-box Tube Plate.—As a result of the research regarding the fire-box tube plate of No. 8855 locomotive, which plate was partly cracked, it was ascertained that the crack was traceable to the exhaustion of the plate caused by the difference of expansion on both sides of it.

Investigation as to the Effects on the Substance of the Remelting of Gun-metal.—As the result of investigation it was ascertained that the remelting of gun-metal scarcely affects the substance or the nature of the metal.

Researches on the Substance of Broken Rails.—As a result of the examination of three rails, which had been broken on the north-eastern line, it was discovered that the causal parts were all at the bottom, where thin scales and slag had formed when the rails were cast. The corrosion of the metal caused by its long use was also determined to be partly responsible.

Investigation into the Breaking of Springs.—As the springs used Sy No. A—21, 600-pattern goods wagons were frequently broken, some comparative tests were conducted on many broken springs. It was found that the slag which had become incorporated in the metal, and the insufficiency of tempering, as well as the weak points caused by the flaws produced in the substance during manufacture, had combined to bring about the defect.

Locomotive Testing Plant

The plant is in Oi-machi, in the suburbs of Tokyo, and is equipped with a locomotive testing room fitted with supporting wheels and axles, brake-gear, apparatus for measuring the tractive force of the locomotive, water supply and fuel supply; pump room and main tank; laboratory; and dynamometer car.

From the beginning of the work in 1913 to the year 1917, 69 cases of trial combustion of coal, 1,523 tests on the analysis of fuel, and 32 tests on locomotives were carried out.

Some of the results obtained are as follows:

In the comparative test for determining the relative merits of the 'one shovel' and 'bunking' systems in regard to coal combustion, it was proved that the former system was superior to the latter.

Burning Test on the Efficiency of the Boiler According to the Water Level.—Experiments made to determine the most advantageous height of the water in the boiler showed, as carried out on the relative efficiency of different levels—high, middle and low, that the higher level produced the better result in this country.

Blast Nozzle and Indicator.—The experiment proved that sizes between 4¼ and 4⅜ inches, with the tip of the nozzle located near the boiler centre, would give the best result at a speed of 15 miles and with the work of about 400 h.p., and the form of the nozzle would make no material difference, provided the dimensions were unaltered.

Supply of Air through the Fire-door.—The test made on the combustion of coal with the fire-door open revealed the fact that the supply of air from the open door may be productive of better results by about 10 per cent.

Baffle-plates.—Doubts as to the relative advantage of the use of short baffle-plates led to tests on baffle-plates of various lengths—9-in., 18-in., 24-in., and 36-in.—and the 24-in. plates were found to do the best work.

Tests on the Efficiency of Locomotives (2,500).—As the efficiency of locomotives at various speeds and cut-offs, tests showed that in hauling the common weight the most economical speed was 12½ miles per hour.

Tests on Timbers

The timber laboratory forms a section of the chemical laboratory and consists of three main rooms, viz.:

(1) room for impregnation of wood preservatives, (2) chemical analysis room, and (3) room for the pure culture of micro-organisms. Results of chief investigations are mentioned below :

Creosoting of Sleepers.—Obtuse ground cypress formed the material of the bulk of the sleepers subjected to the test, and it was ascertained that the quantity of creosote required for treatment is 4.5 *sho* (1.8 gallons) per sleeper. It was also proved by subsequent experiments that creosote oil is the best and most economical preservative.

Blighted Arbor Vitae.—In compliance with the request of the forestry bureau, tests were made upon the strength and durability of the arbor vitae procured in Aomori prefecture. These trees had been blighted in large numbers by smoke, and it was ascertained that the blighted timber was equally serviceable as material for car-building and for long sleepers.

Ceratostomella Pilifera (Fr.) Wint.—As regards the blue stains which often appear on the wood while undergoing desiccation, thereby damaging its quality, it was found on investigation that the damage was due to the noxious bacteria known as "*ceratostomella pilifera (Fr.) Wint.*" Artificial culture showed that the bacteria is very rapid in growth, and that a solution of corrosive sublimate or fluid of soda is the most effective preventive for it.

District Laboratories

There are three district laboratories, at Kobe, Moji and Sapporo, which, under control of the central laboratory, attend to the testing of railway stores of local importance.

Quicksilver Mining in China

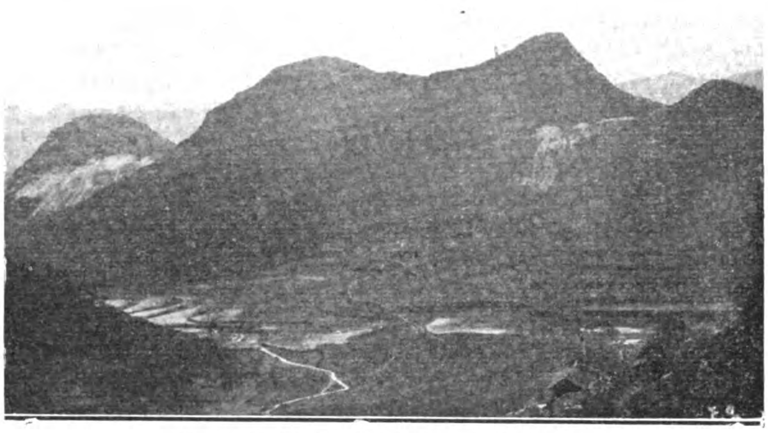
At a meeting of the Cornish Institute of Engineers, Frank Trythall read a paper describing the mining of quicksilver in the Toonyen prefecture, Kweichow province, South China. Quicksilver has been extensively mined in Kweichow, for how long no information can be obtained beyond the assertions of the landowners, who claim that their ancestors were mining for quicksilver during the Ming Dynasty (1368-1644). Gunpowder was introduced for the first time as an explosive about the year 1870 by miners from Szechuan. Previously fire-setting and the hammer and gad were the only means of mining. The geological formation of the region is magnesian limestone, in horizontally stratified beds of several hundred feet in thickness. The mineralized zone is roughly three miles square. The quicksilver deposits are not continuous, and they are irregular in shape. The country is cut by canyons running in various directions, and it is noticeable that those deposits which are near the rim of the canyons are richer and more extensively worked than those occurring farther afield. The ore occurs: (1) As impregnation of well-defined beds of limestone ; (2) along the joints, cracks and planes of stratification ; (3) in isolated bunches, nests or pockets, and in vughs or cavities which contain crystalline aggregates or well developed crystals of cinnabar in the form of penetration twins of two rhombohedra, associated with quartz and calcite ; (4) irregularly disseminated through a number of beds which have, in most cases, undergone considerable local disturbances. There are two varieties of cinnabar. One is a bright, transparent red, the other a dark, opaque red with which antimony is almost invariably associated in small quantities. The former is known as the "red," and the latter as "black" cinnabar. Pyrites is entirely absent. Native mercury is occasionally met with, associated with the antimonial ores. These deposits are similar to, and characteristic of, others in the districts of Beh-mah-tung, Wuchuan and Pachai.

The methods employed in mining and smelting are distinctly crude, and conform to no laws or regulations. About the time of the writer's visit, mining regulations were issued by the imperial government, but were never enforced, nor was the slightest notice taken of them. In the mines known as "private" mines, which have been acquired by a company, the miners are required to sharpen their own drills before entering the mine, and drill and fire two 15-in. holes. They drill single-handed with 7-lb. hammers, a back hole counting double. The drills, ¾-in. diameter, are of iron, pointed with steel at both ends. Other mines, described as "public," are usually old workings which have been abandoned by companies as too poor to work, but still containing patches of sufficiently remunerative ore for individual miners, who are allowed to work them on payment of 600 case (1s. 7d.) per month, known as "hammer tax," to the local magistrate. The miners work either on day's pay or on tribute. In the first case the hours worked amount at most to six ; but every fifth day, being market and pay day, is regarded as a holiday, when they receive 400 cash (about 1s.). In addition to the wages they are supplied daily with two meals, consisting of boiled rice and vegetables, and on market days a small portion of pork. The meals cost roughly 50 cash or 1.6 pence each. Thus a miner on day's pay earns, inclusive of his food, 130 cash (4.2 pence) per day, and works at the outside 24 hours in five days. Overtime is paid on all holes drilled above two in a shift at the rate of 1.2 pence per hole. The tributer supplies his own tools, explosives, etc., and works without restriction on a piece of ground allotted to him by a company, and his ore has to be taken to the company's smelter for treatment. He is paid for the quicksilver so produced at a rather lower rate than the prevailing market price, and, in addition, the buyer retains such mercury as remains in the furnace. All taxes are paid by the company to the officials and land-owners, whether the mines are worked on day's pay or tribute. In the blasting operations, after the hole has been drilled to the required depth, a pricker is inserted and from two to three ounces of gunpowder are tamped around it with an iron rod, after which the hole is filled with clay, or fines, nearly to the top. The pricker is then carefully withdrawn by twisting it with a pointed bar inserted in the eye of the pricker, and, in the space thus left, the fuse is introduced and a conical-shaped piece of paper attached to the end of the fuse, which, on being lit, smoulders and acts as a time fuse until it reaches the powder. The native fuse consists of a peculiar kind of brown paper, treated with nitre, and rolled very tightly, enclosing a minute quantity of gunpowder. When finished it has the appearance of a piece of whip cord. The timing is very unreliable. Owing to the inferior quality of the gun-powder (which is made on the mines from ingredients obtained locally), the explosive force is small, only from 200 to 300-lb. of rock being dislodged per hole drilled.

No system of driving, sinking, or stopping is observed in the winning of the ore, the miner simply following a stringer on a mineralized band of ore, enlarging or reducing his working face as the mineral widens or pinches, resulting in a series of intricate workings. Timbering is unnecessary, as the ground is compact and holds well, even in the largest workings. The ore is transported from the working face to the surface by means of baskets carrying 30 to 40-lb., fastened to the coolie's back by ropes which pass under the arms. In the very low and narrow workings where it is impossible to stand upright, wooden boxes containing the ore are drawn along the floor by small boys, crawling, with a rope passing around the neck, down the stomach, between the legs and attached to the box. On the ore reaching the surface, coolies, termed ore

pickers, cob and pick it, as much as possible of the barren rock being discarded. The large crystals of cinnabar are detached by means of a stout pointed wire. The ore is crushed on a large flat stone with hammers, to pass a $\frac{1}{8}$-in. bamboo sieve, and if the cinnabar is of the red variety, it is panned, the concentrates removed, and the tailings treated for quicksilver in the furnace retort. If the cinnabar is black, the panning is dispensed with, and the whole put direct into the furnace.

During the winter months, when agricultural labor is more or less at a standstill, a large percentage of the population turn their attention to the working over of the old dumps, and may be seen wending their way to the dumps at all hours of the morning, armed with a basket, hammer and rake, and sometimes a lamp to enter the abandoned mines, returning in the evening with perhaps 10 to 15-lb. of picked ore containing 1 per cent. to 2 per cent. quicksilver. This ore is disposed of to the owners of private furnaces, of which there are a number scattered about the district. Pumping is a minor item, from the fact that the deposits are not



Patungla Quicksilver Mines, Kweichow

deep-seated, and the deeply carved and fissured country does not permit of the accumulation of large quantities of water, which would prevent the natives from carrying out their primitive modes of mining. Where water accumulates in sufficient quantities to check operations, a bamboo or wooden chain-pump is installed, similar to those used for irrigation purposes, but if they prove inadequate, the workings affected are abandoned until the water recedes. Ventilation is also a question which does not worry the Chinese miner. The imperfect combustion of the explosive, the smoke arising from the oil lamps, the filthy habits of the miners themselves, and the fact that many absolutely live in the mine for fear of having their rich ore stolen, tend to make the air as foul as it is possible to conceive, and often, on entering a working, it is almost impossible to see how many are at work or what is being done. The miners will submit to all these discomforts and dangers to health rather than do any work which would cause expenditure without direct remuneration.

The furnaces, built in pairs, are 2-ft. 6-in. in diameter and 1-ft. 6-in. in height. Each consists of a cooking pan, which serves as a receptable for the ore, resting on a round fire-place made of unburnt bricks, on which is placed a similar pan inverted, with a 12-in. hole in its centre. On this is built a collar of clay, 12-in. high, strengthened by a plaited bamboo network, extending a few inches above the clay collar, serving as a support to the upper pan. The top of the clay collar is grooved in the centre, and a third pan, with a 12-in. diameter hole, rests on its inner rim, and this, being covered by an earthenware pot which acts as a condenser, an annular space is formed between the groove, the lower part of the top pan, and the inner side of the bamboo network. Three holes $\frac{3}{4}$-in. diameter are pierced through the rim of clay on which the topmost pan rests, and are known as "percentage holes," inclining towards the centre of the furnace. The amount of quicksilver collected in this annular space depends on the inclination of the percentage holes, increasing in quantity as the angle of inclination increases. The earthenware pot or condenser is luted with fine residues and the bamboo network is lined with clay. Wood fuel is used for heating purposes. The usual charge for one furnace is 50-lb. of ore. The quicksilver vapours condense in the annular space and earthenware pot, which is changed at intervals until the ore is exhausted, when the residues are withdrawn by means of a shovel the blade of which is at right angles to its handle, and replaced by another charge. While the condenser is being changed, the ore in the pan is stirred with a wooden pole, the fumes escaping copiously during the operation. The condenser becomes coated with minute globules of quicksilver, which on removal are run together by rubbing the surface with a rag forming a pool at the bottom of the pot. The losses, as far as can be estimated, vary between 30 per cent. and 40 per cent. of the total quicksilver. The amount collected in the condenser naturally depends on the richness of the ore treated, and sometimes as much as a catty (1.3-lb.) is collected. The metal is poured into bamboo flasks and eventually transported to the river ports in pigs' bladders. The residues, especially in the case of rich ores, which still contain imperfectly burnt ore, are ground by hand, sluiced and the concentrates again retorted.

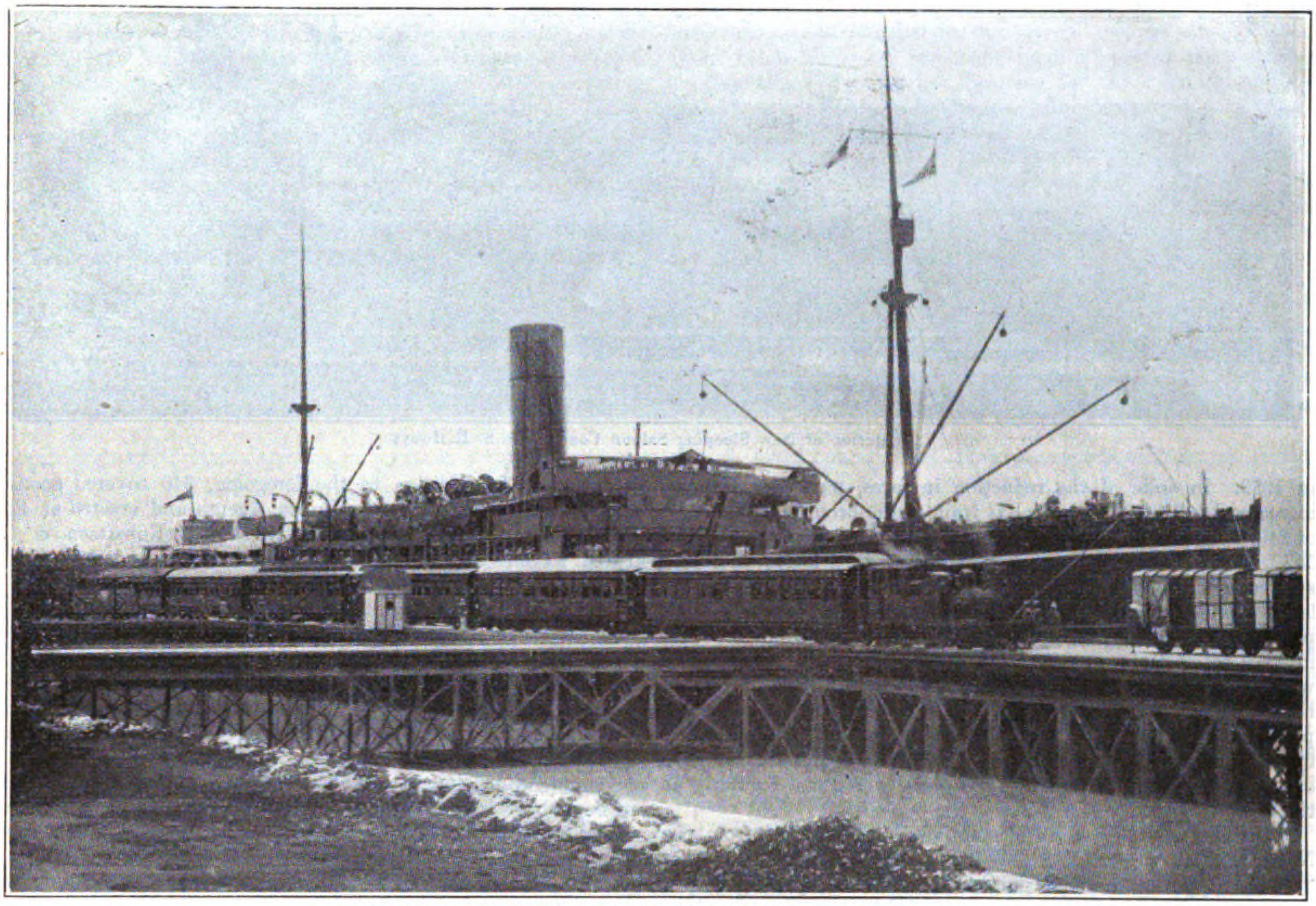
In addition to the furnaces at work near the mines, considerable numbers are owned by individuals who carry on custom smelting, receiving in payment the quicksilver collected in the annular space through the percentage holes. The ore treated in these furnaces in obtained from the mines or from the dumps, and not infrequently by theft. The owners of private mines have a set of furnaces for rich ore, and another for poor ore, and, if the miner strikes a rich pocket, the ore is treated in the rich-ore furnaces, the percentage holes being so inclined that the furnace owner receives about 40 per cent. of the total distillate as his share. This is an established custom to which the miners willingly conform —*Mining Magazine.*

Boosting Hongkong

HONGKONG is also waking up and getting ready for a big exhibition to be held sometime next year if present plans are carried through. The object of this exhibition, says the *China Mail,* is to bring more tourists to the colony and advertising the great trade facilities which Hongkong offered to merchants and also to exhibit the products of different provinces in China. Letters had been sent to the Chinese chamber of commerce soliciting information as to whether the Chinese would assist in the enterprise and the promoters of the scheme had discussed with its president, Hon. Lau Chu-pak, the question of formulating plans for this gigantic project which, he was confident, would not only yield untold benefit to local commerce but would be the means of giving prominence to the colony. The site of the exhibition, which covered an area of nine miles, would be selected in Kowloon.

A conception of the large scale on which the exhibition was to be held could be obtained from the size of the space required and it was the intention of the organizers to run it on such lines as would give them the result they desired.

There would be houses built to the same height and size and in the same style as genuine houses so that they could be inhabited by people during the time the exhibition was held. Then there would be railways, tramcars and motor cars in miniature, everything designed to fascinate visitors. The winter season was most desirable to hold the exhibition because rain in winter was scarce and therefore the articles exhibited could be preserved for a longer period. If the exhibition, which was to last several months, could attract people to Hongkong from all parts of the world, the colony would be benefited. No definite plans as yet been prepared, but it was expected that in February or April next year arrangements would be completed.



RAIL AND STEAMSHIP CONNECTION AT PORT SWETTENHAM

Federated Malay States Railways, 1920

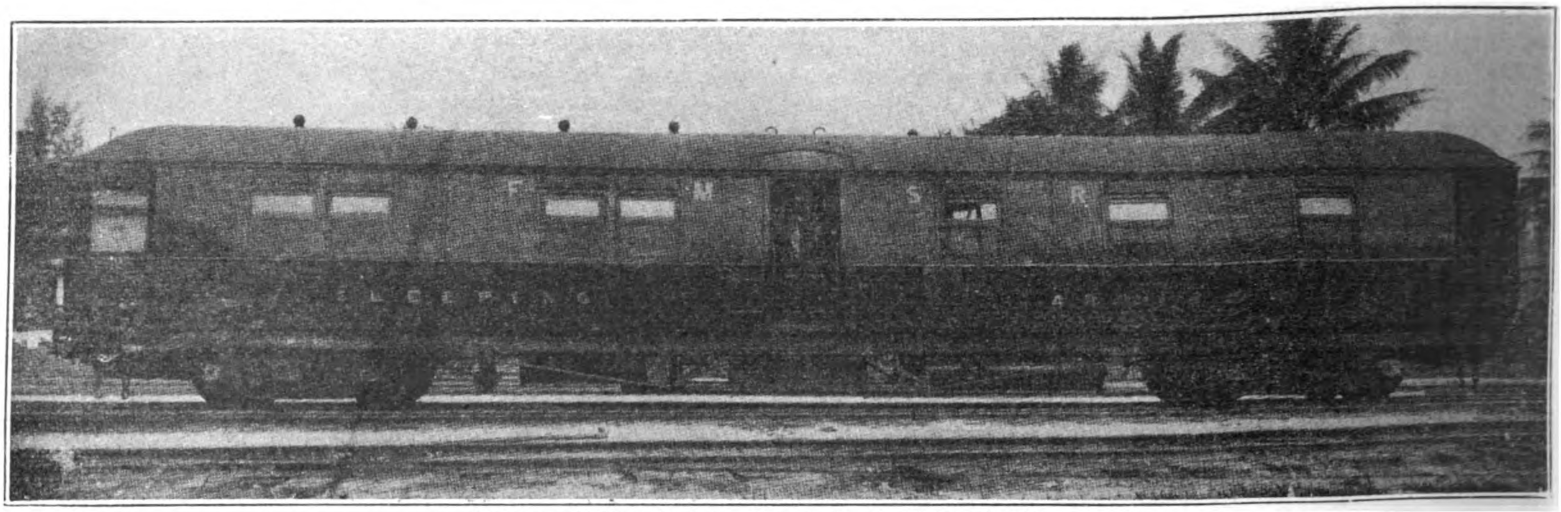
ACCORDING to the report of Mr. P. A. Anthony, M. Inst. C.E., the general manager of the Federated Malay States Railways, there was a net profit last year on the working of the lines under his charge of only £65,704. In other words, the earnings were only 0.39 per cent. on total capital expenditure. The figures compare with £386,218 and 2.67 per cent. respectively. The main factors contributing to the large decrease in profit were: (*a*) Increases in rates of pay and allowances to the staff; (*b*) increased cost of materials of almost every description used in railway working, whether locally produced or imported; (*c*) a corresponding increase in all branches of contract work; (*d*) and trade depression consequent upon the fall in price of rubber and tin.

The percentage of increase in the pay of the clerical service was from 56 to 90 per cent.; in the traffic-operating grades, from 80 to 106 per cent.; and to the monthly paid subordinate staff, 77 per cent. Furthermore, in addition to an increase of pay by 25 per cent., the daily paid staff were supplied with rice and bread at cheap rates, making in all an increase of about 60 per cent. Materials, stores and railway equipment show increases in cost from 50 to 500 per cent.

With a view of maintaining the railways on a paying basis, it has been necessary to increase the terminal charges pertaining to goods train traffic and to increase the rates for parcels and perishable traffic carried by passenger train. A ferry toll was introduced on traffic by the ferries between Johore and the island of Singapore; but a reduction in passenger fares from 50 to 25 per cent. above pre-war rates came into operation on January 1st, 1920, and there was an increase of 3,227,315 passengers carried. Passenger traffic by the through railway between the Federated Malay States and Siam increased during the year, but there was a falling off in goods traffic consequent on the suspension of the export of rice from Siam throughout the year. Stores and materials to the value of £1,031,420 were purchased during the year, representing an increase of £212,072, as compared with 1919. The tonnage in respect of the crown agent's shipments aggregated 7,785 tons, as against 2,267 tons in 1919, in addition to which 103 tons and 3,774 tons were received from Canada and Australia respectively.

The new line from Pasir Mas to Rantau Panjang in Kelantan, with a total length of 11 miles 37 chains, was opened on September 1st. The total mileage of running lines—reduced to single track—open on December 31st last was 1,014 miles 67 chains, including the Johore leased line, and of running lines and sidings 1,150 miles 71 chains. There are now 222 permanent stations and 24 flag stations or halts open for traffic.

The total capital expenditure to December 31st last was £16,815,706. During last year a sum of £2,386,156 was spent, of which £741,282 was in connection with the construction of new lines, £919,605 for widenings and additions, including new wharves, etc., at Prai and the Johore Causeway to connect Singapore with the mainland, and £419,795 for new rolling stock. Receipts from all sources amounted to £2,020,262, as compared with £1,745,037



Exterior of New Sleeping Saloon Coach, F.M.S. Railways

in 1919. In spite of the reduction in fares, passenger receipts increased by £183,907, and goods train traffic brought an increase of £49,033. The expenditure on all accounts amounted to £1,954,-557. Under locomotive running expenses, very heavy increases are recorded, notably £102,309 for fuel, due to the insufficiency of local supplies, necessitating the purchase of coal at very high prices. The cost of fuel per engine mile increased from 28 cents in 1919 to 39 cents in 1920. The total running costs per engine were 64 cents for 1920, as compared with 46 cents for 1919. During the year 104 ocean steamers called at Port Swettenham with import cargo, as against 63 in 1919, and 60 ocean steamers called for export cargo, as against 32 in 1919. These figures are exclusive of the British India Company's steamers, which call regularly at the port.

Sixteen new "P" class locomotives were received from the North British Locomotive Works, Glasgow. Four "Q" class "Pacific" type locomotives, purchased in 1919 from the Baldwin Locomotive Works, Philadelphia, were also erected and added to the stock during the year, thus making an addition to the open-line stock of twenty new locomotives. Orders for forty new locomotives were also placed during the year—twenty "L" class from England and ten six-wheel coupled side tank locomotives from Baldwin Locomotive Works for the open line, and ten tender locomotives from the Baldwin Locomotive Works for the construction department. The open line stock of locomotives, including the steam rail motors, was 204, and of construction department locomotives twenty-two at the end of the year. The total engine mileage, including maintenance ballast miles, for the year under review was 5,666,121, as compared with 5,006,936 in 1919. The train mileage was 3,940,732, as against 3,463,405 in 1919. The average daily miles per engine actually at work was 108.6.

Thirty-two mail type bogie passenger carriages were newly built at the works and turned out to traffic, as against eighteen in 1919. One was a bogie sleeping saloon of a new design, with transverse berths instead of longitudinal berths, as in the old sleeping coaches, and all the eight double-berth cabins are of the same size. Twenty-one mail type bogie passenger carriages were under construction at the end of the year; 248 coaches of all types passed through the shops for heavy and light repairs, as compared with 226 in 1919. The total stock of bogie goods vehicles at the end of 1920 was 169, as compared with 132 in 1919. The construction of 47 bogie flat wagons was in progress at the end of the year; 374 wooden wagons were constructed at the central workshops. In addition to the foregoing, 340 covered goods—steel—were received from the Crown Agents and erected at Port Swettenham on contract by Messrs. D. G. Robertson & Co. These wagons are part of 500 steel covered goods ordered in England in 1919. Ten fish vans were in process of construction.

The total expenditure during the year on construction and surveys of new lines in the Federated Malay States, Straits Settlements, and Johore amounted to £1,661,088, as compared with £893,246 in 1919. Both in Kelantan and in Pahang progress was made towards the completion of the east coast railway, which will run from Gemas in the south of Selangor to Tumpat in Kelantan. The extension from Pasir Mas to Rantau Panjang, a distance of $11\frac{3}{4}$ miles, which joins the Siamese system, was opened for traffic in September last. After an interval of six years, work was recommenced on the Penang hills railway, and preliminary work begun on the Kuala Kubu deviation of $5\frac{1}{4}$ miles. The survey of the new line from Malacca to Gemas—$44\frac{1}{2}$ miles—was completed, and a survey was under progress with a proposed line from Kuala Krau to Kuantan, in Pahang. The lines from Kuala Lumpur to Port Swettenham, from Batu Junction to Kuala Lumpur and Sungei Besi, and from Woodlands to Fort Canning (Singapore) are to be doubled, and the work was under way at the date of the report. New engine and carriage sheds and a goods yard were under construction at Ipoh, in Perak, and considerable progress had been made with the additional goods and marshalling accom-

Construction of the F.M.S. Railway Causeway between Johore Bahru and Woodlands. Site of Lock, Looking East

modation at Kuala Lumpur, in Selangor, and the new carriage and engine accommodation at Seremban, in Negri Sembilan. A contract for the erection of six godowns—warehouses—at Teluk Ayer Reclamation, Singapore, was let to Messrs. Robert Young & Co., Penang, the price being £166,063. The Federated Malay States Railways are constructing departmentally a reservoir and dam at Bukit Serayah, about 11 miles from Prai, for the supply of water for Prai and Bukit Mertajam. On that work £33,845 was spent during the year. Two of the largest pieces of work in hand are the reclamation of the foreshore and construction of wharves and godown accommodation at Prai, province Wellesley, opposite the island of Penang, and the construction of the causeway across the Straits of Johore to connect the island of Singapore with the mainland, and provide for a double line of rails and a motor road. Both contracts are being carried out by Topham, Jones and Railton, Limited. Good progress was made with the jetty at Prai, 213 of the concrete cylinders being sunk up to the end of the year out of the 323 required. The cylinders are all founded in the layer of coarse sand at about 53-ft. below low-water level, and have all passed the prescribed loading test. The concrete hearting for the cylinders and the mass concrete capping beams are being proceeded with, and a start has been made with the reinforced concrete decking. It is expected that about 850-ft. of jetty will be opened for traffic at the end of the present year. The supply of labor is plentiful, and 52 Europeans and 2,000 Asiatics are employed on the works. The value of the work done at the end of 1920 was £431,650, or about 38 per cent. of the whole contract.

Good progress was made with the work on the Johore causeway. The construction of the lock at Johore was well advanced, and the north wall of the lock was about one-half completed. In addition. the first two lengths of the east and west wing walls were built, The eastern portion of the water-tight cofferdam enclosing the south wall of the lock was ready for closing at the end of the year.

Penang Hills Railway

THE following is an abstract of a paper presented to the Engineering Association of Malaya, by Mr. A. R. Johnson, resident engineer, Penang hills railway, on the occasion of their inspection of the railway on September 24th, 1921.

The conditions governing the lay-out and equipment of a steep cable railway are entirely different from those obtaining in the case of an adhesion or rack line. In laying out the later, after the general route, ruling gradient, and minimum curvature have been decided upon, considerable elasticity is permissible, in the detailed location, and the surveyor in running his trial lines, can go back upon his route and modify it if he finds himself getting into too difficult country. The location of any particular portion of the line is independent of that of any other portion and tangents, curves and gradients may be combined and succeed each other in an endless variety of ways.

In a well-designed cable line, any portion is not only dependent upon those which immediately precede and follow it, as in an adhesion line, but upon the whole lay-out from beginning to end, and it is impossible to introduce local deviation either in gradient or planimetric position without affecting the entire location of the line.

This stringent condition of design will be clear from the following considerations. The cars are not self-propelling, but connected by the haulage rope, hence their motion is interdependent. The haulage rope has to be moved as well as the cars, and its weight may be as great as that of the cars themselves.

The theoretically correct profile consists of a parabolic curve of which the variation in gradient is such that the tractive effort to be exerted by the hauling engine is a constant. It is, of course, advisable to avoid horizontal curvature as in an adhesion line, as far as possible, but the introduction of such curvature even in a marked degree, does not involve any serious interference with the theoretical efficiency of the line, if the correct profile is maintained.

How the Cars Work

The arrangement of the cars and the position of the haulage engine on this line are those generally adopted on modern lines of the type. The haulage engine is placed at the top of the line and there are two cars attached to either end of the haulage rope, which is led up the line from one car, over the drums of the engine and thence down the line to the other car. In this case the line is divided into two separate and independent sections but as they are both identical in principle, I will consider only one section.

Let us call the ascending car A and the descending car B. The cars pass each other at the middle of the line. If car A is at the bottom and car B at the top, it is clear that the engine has to haul up the rope to which car A is attached in addition to the car, and that as the car ascends this load continually decreases. The portion of the rope attached to car B is similarly continually increasing. When the ascending car A is below the middle point of the line, the weight of the portion of the rope between the positions of the cars at any moment is acting against the engine, as the two ends above the upper car are equal in length and mutually balance.

When the ascending car has passed the middle point, the descending rope is the longer and the weight of the difference in length of the top ends is assisting the engine. When the cars pass each other at the middle point, the load due to the weight of the rope vanishes as both ends are the same length.

From this it is clear that if one could have a weightless rope, in order that the tractive force might be a constant, the line would have a uniform gradient throughout, and the tractive force exerted by the engine would depend only on the difference in the weights of the cars. But as a weightless rope is impossible, in order to keep the tractive force constant, it is necessary so to design the profile that the difference in the load due to the cars varies in a ratio dependent upon the varying ratio between the rope ends.

From this general outline of the problem, it will be clear that the location has to be considered as a whole, and that it would be a waste of time to attempt to lay out a trace in the usual way by trial lines run from some selected starting point without any knowledge of the ground in front.

Locality of Line

The most suitable locality for the line had first to be determined. The conditions governing this selection were that the slope of the hill chosen must be a comparatively short one and uninterrupted by isolated summits, that the starting point of the line must be as near as possible to a main road, and that the upper terminus must be at a point easily accessible from the existing roads and buildings on the hill. The portion of the hill-side which lay within this general area was then surveyed.

I found the whole slope of the hill extremely broken and uneven. Precipitous faces of rock, some of great height, were common on the upper slopes, while the lower were intersected by numerous gorges filled up with boulders of all shapes and sizes; one which

the line crosses on a viaduct I estimate to weigh over twelve thousand tons. About sixty different locations were investigated before the final one was decided upon.

The line is in two separate and independent sections, both of which have a theoretically correct parabolic profile. Horizontal curvature had to be introduced on both sections; that on the lower consisting of a short curve of fifteen hundred feet radius at the bottom. There are two curves on the upper section, the radius of the sharper of the two being also fifteen hundred feet.

It would have been possible to obtain a location in a single section, but to have approximated to the best conditions, it would have had to have had a great deal of horizontal curvature, very high viaducts and probably several tunnels; it would have been more costly to build, work and maintain, and its carrying capacity would have been less than that of the location adopted.

The total length of the line measured along the formation level is one mile 435 yards. The mean gradient is slightly less than 1 in 3 and the maximum 1 in 1.93. The centre of the upper station is 2-381 feet above mean sea level.

Foundations and Cars

The whole line is carried on masonry throughout, the track being built into the masonry and anchored by long bolts at suitable intervals.

The rails are of a special section with a wedge-shaped head, to provide a suitable grip for the car brakes.

The viaducts are built of masonry with concrete arches, and there is a tunnel 86 yards long on the upper section close to the top of the line.

The cars are each capable of carrying about 40 passengers, and as one trip can be made every quarter of an hour, the maximum carrying capacity of the line is about 160 passengers in each direction per hour. They are built to the mean gradient of the line, and are divided into four compartments and two end platforms for the car attendant; all of which are stepped one above the other so that the floors are level.

Each car is fitted with three emergency brakes, two of which are automatic and each of which is capable of pulling up the car fully loaded on the steepest gradient in a distance of five to six feet. Each brake consists of a pair of forged steel jaws which grip the specially shaped rail head.

Special provision is being made for dealing with goods traffic in loads up to about 2½ tons, to permit of an economical development of the hill.

The motive power of the line will be electricity which will be obtained from the municipal power station at Penang. The haulage engines will be fitted with all necessary safety devices.

A special signalling installation will be provided, to ensure that both cars are ready before the driver starts the engine, and to permit of the car men despatching signals to the driver from any point of the line.—*Penang Gazette.*

Prai Water Supply

ON the occasion of the visit of the engineering association of Malaya to Penang recently, when inspections of the various public works on the island, and in Province Wellesley, were made, several very interesting, if highly technical, papers referring to the works inspected were read.

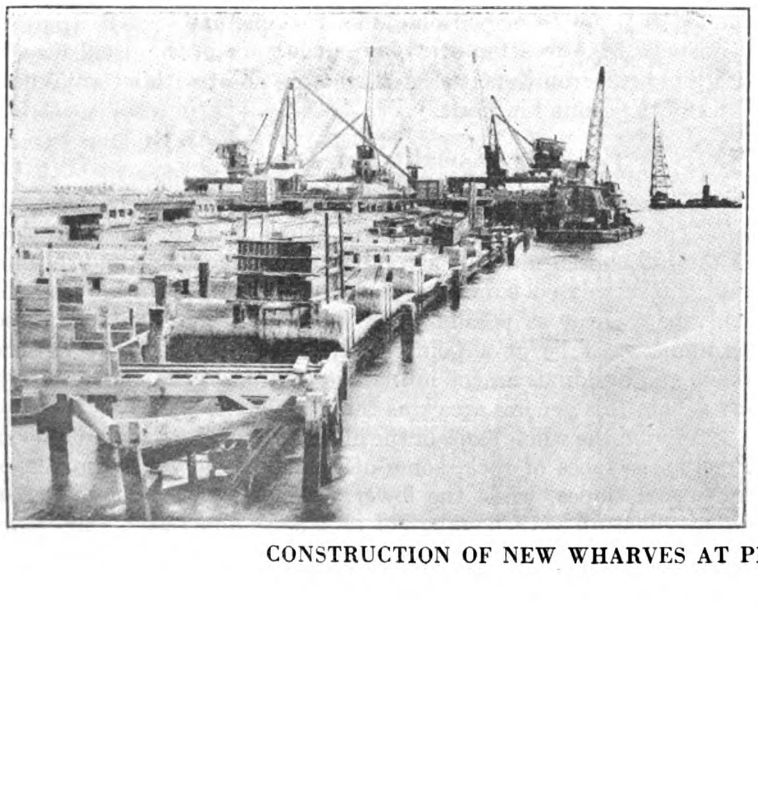
The first inspection was carried out at Bukit Serayah on Friday morning, September 23, where the new works in connection with the Prai water supply are being constructed under the supervision of Mr. D. W. Brisbane, section engineer, F.M.S. Railways. Prior to the inspection, Mr. Brisbane read a paper to the members explaining the scheme, a resume of which is given below:

At the present time Prai does not possess a sufficient water supply, and practically all the water required by the railway department and other large users, is obtained either by rail or water boat. With the completion of the new wharves at Prai, shipping and other additional demands will have to be met and in order to provide for these requirements a scheme is being constructed which comprises a masonry dam and storage reservoir at Bukit Serayah, a pipe line to Prai and an elevated storage tank and service mains at the latter place, designed to supply 500,000 gallons per diem.

Catchment Area

The catchment area is situated on the southern slope of Bukit Serayah and covers 217 acres. It is considered that the rainfall at Bukit Serayah is not less than at Parit Buntar, and a mean annual precipitation of 95.7 inches, and a minimum of 65 inches have been assumed for the catchment. In a year of minimum rainfall, the total yield from 65 inches would be 319,000,000 gallons which would give an estimated run-off of 185,000,000 gallons.

The water was submitted to a chemical and physical examination by the institute of medical research, Kuala Lumpur, and was found to be of considerable organic purity. The analysis did not disclose any reason why the water should not be suitable for domestic purposes. The whole of the catchment area has been acquir-



CONSTRUCTION OF NEW WHARVES AT PRAI, BY THE F.M.S. RAILWAY DEPARTMENT

ed, and all dwellings are being removed or destroyed in order to avoid all risk of contamination.

Reservoir

The minimum annual run-off available for storage is estimated at 185,000,000 gallons. Evaporation and absorption are expected to amount to 35,000,000 gallons, leaving a gross amount to 150,000,000 gallons. Deducting from this figure, the quantity in the bottom of the reservoir which cannot be drawn off, the nett available supply is 147,000,000 gallons. The reservoir has been designed to have a capacity of half this amount, and the actual nett capacity of the complete reservoir will be 72,000,000 gallons. This is enough for 4½ months' supply at the maximum daily draft of 500,000 gallons. The surface area of the full reservoir will cover eleven acres.

The Dam

Perhaps the most interesting part of the work is the dam, the site of which is situated below the junction of two small streams and between two fairly steep spurs. Below this site, the valley falls very quickly. The dam, which is of the gravity type, will be constructed in cement concrete. The maximum height from toe to spillway level at any section will be about 80 feet, and the maximum available depth of water when the reservoir is full will be 55 feet. The total crest length will be about 450 feet, including a spillway of 60 feet wide. The coping of the spillway will be 424 feet above rail level at Prai station. The foundation of the dam is granite, but unfortunately a large fissure about 30 to 40 feet wide, extends across the site, and runs approximately parallel to the general direction of the valley. The fissure is now being excavated, and has reached a depth of about 50 feet below the original surface. The government geologist has examined the site. He reports that the extent of softening is not unusual.

Draw-Off Tower

The draw-off tower is to be built of concrete with cast iron lining and fitted with four 10-inch diameter intake valves and a 24-inch sluice valve. A grating and 40-inch flap valve will admit the water to the sluice valve and a tunnel through the dam will carry the 10-inch supply main through the dam from the draw-off pipe. A 10-inch cast iron main will convey the water to Prai, 10½ miles away, and is calculated to deliver 38,000 gallons per hour.

Storage Tank

The elevated storage tank proposed, will consist of three cast iron tanks, capable of being used singly, in pairs, or together. The tanks will have a capacity of 110,000 gallons, and will be supported on reinforced concrete columns 50 feet high. The foundations will be piled.

The paper concludes with a detailed description of construction, transport and supply of water to shipping. It is suggested that a place where water boats can fill up should be provided and thus reduce the number of water boats required.

The new Mitsubishi Office Building in Tokyo now under construction by the George A. Fuller Company of the Orient. At the right is seen a corner of the new Nippon Yusen Kaisha Building also being constructed by the same company.

Asia's Largest Building

THE largest office building in Asia is now being erected in Tokyo for the Mitsubishi Company on a site immediately facing the central railway station. The contract is being carried out by the George A. Fuller Company of the Orient, a subsidiary of the American firm who erected the Flatiron Building in New York. The cost is estimated at seven to eight million yen. It will be used for offices and consist of eight stories on an area of 350 by 300 feet. The building will be of steel, reinforced concrete floors, with a buff colored facing tile or brick. The inside will be finished in tile, marble and stone, making a complete fireproof structure.

In addition to the above, the Fuller Company will erect a modern office building of seven stories with 300,000 square feet of floor space for the Nippon Yusen Kaisha to cost approximately Yen 5,000,000. The site of this building is immediately behind the Mitsubishi Building and facing the Kaijo Building. The third contract is for the erection of a seven-story building for the Nippon Oil Company to have a floor area of 200,000 square feet and will cost about Y.3,500,000. Work on the Mitsubishi Building is proceeding apace now that the initial difficulties have been overcome, and by the end of December the contractors expect that the entire steel work will be erected and the walls well under way, and opened to occupancy by the end of 1922.

Undoubtedly one of the most ornate and imposing buildings in Asia has just been completed for the home of the Mitsubishi Bank in Tokyo, at a cost of Y.3,000,000. It is entirely of white granite, covering 800 *tsubo* of ground.

Italian marble and polished granite will form the basis of the interior finish. The banking room is to be finished in American terra cotta and polished granite.

Locomotive Development on N. E. I. Railways

(A Paper compiled at the offices of the State Railroads and Tramways of the Netherlands East Indies)

A CLEAR idea of the enormous increase in transport and traffic on the railroads and tramways in Java between the years 1894 and 1919, may at a glance be obtained from the figures in the table given below.

	1894	1919
Proceeds from transport of passengers in *millions of guilders*	2.54	22
Proceeds from transport of goods ditto, ditto	4.75	28
Number of passenger-kilometres in millions of kilometres	167	1800
Number of vehicle-kilometres in ditto, ditto	78	1150

This rapid growth in the last 25 years dating from the completion of the first railway-connection between Batavia and Sourabaya, naturally has had a great effect upon the nature of the rolling-stock, as will be seen from the following table :—

	Proceeds.							
Year	Passenger Transport millions of Guilders.	Goods Transport millions of Guilders.	No. of Engines.	Weight of heaviest engine.	No. of Carriages.	Weight of heaviest carriage.	No. of cars.	Capacity two-axled cars in tons.
1894	2.545	4.73	206	33 tons	444	10 tons	2419	8
1919	22.	28.	568	133 tons	1687	40 tons	11274	12

LEVEL LINE LOCOMOTIVES

1 B-Fox Walker Tender Engines

The first seven tender engines were supplied by Fox Walker Co. of Bristol for hauling trains of 125 tons on maximum gradients of 10 per cent. and with curves of 150 metres minimum radius. They are now being used on the tramways in the Madioen-Residency.

1 B-Linden Tender Engines

In 1886, eleven engines were supplied for the Djocja-Tjilatjap line by the Hanover Maschinenbau Aktien Gesellschaft, intended for passenger-trains on gradients of $\frac{1}{120}$ to $\frac{1}{100}$ and with curves of 150 m. minimum radius. These engines are now used for shunting, and on stretches where traffic is moderate.

1 B-Twin Cylinder Engines with Two-axled Tender

The 1 B engines with two-axled tender, made by Sharp Stewart & Co., of Manchester and Glasgow, have played an important part. They are typically English, very simple and sound in construction. The first ones were put into use in 1880, whilst the last ones of the series were bought in 1896. They have a driving-wheel diameter of 1412 millimetres, and haul mixed trains of 160 tons on maximum gradients of $\frac{1}{150}$ and curves with a minimum radius of 250 m. on free stretches, at an average speed of 40 kilometres an hour.

It is striking how afraid people were at that time, lest the position of the boilers should be too high. This can be observed from the older specifications where we find the injunction the centre of the boiler to be as low as possible and not higher than 1.68 metres above top of rail. The need of stoking with inferior kinds of coal was, however, immediately foreseen, and in addition to a large grate-area, a large heating-surface of the fire-box was also provided for. The boilers were originally fitted with brass tubes which have been replaced in the last ten years by iron ones. Before the arrival of the 2-B compound passenger-train engines, the 1-B engines had also to draw fast trains at a maximum speed of about 60 km. an hour, for which purpose 12 of them were provided with vacuum-brakes. At present they are exclusively used for mixed trains and a few passenger-trains with a maximum weight of 210 tons at a maximum speed of 45 km. an hour on level roads or a maximum of 180 tons at an average speed of 35 km. an hour on gradients of 5 per cent., for instance, on the divisions Wates-Djocja and Batavia-Merak.

When the train-service became heavier (at present practically all the engines work at full load) the frame had to be considerably strengthened transversely. The renewal of the old boilers on account of defects in the rivet-seams, first gave rise to an examination as to whether it would not be advisable to provide the engines with *larger* new boilers. When it appeared that a larger boiler would involve very great alterations, it was decided to make a few new boilers suitable for super-heated steam whilst retaining the former chief dimensions, with the old working tension of 10 k.g./cm^2, so that the appendages might remain unaltered. The amount of transformation of the engines has thus been reduced to a minimum and when it is carried out, they will be fitted with Friedmann lubricating-pumps and balanced slide valves.

The application of super-heating (Schmidt system) will considerably increase the capacity both of boiler and engine, so we may expect that the 1 B Sharp Stewart type of engine will for a long time remain one of the very useful and practical traction units.

Now that they are being gradually crowded out of Java they can in future in Sumatra and the other out-lying parts of the colonies, render the same services which have been so profitably rendered in Java up till now to such a great extent.

The number at present in use is over 65.

2 B Passenger Train Engine with Compound 3-axled Tender

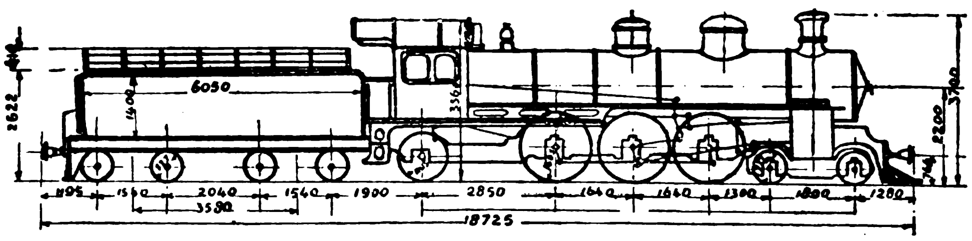
When, towards the end of last century, it was foreseen that the express passenger traffic would demand a speed of more than 60 km. an hour, it was deemed advisable to employ bogie-engines. The type chosen was the 2 B type, 44 of which were purchased from 1900 to 1910; 26 from the Hanover Engineering Company at Linden, 10 from the Netherlands Engineering and Rolling Stock Manufacturing Works at Amsterdam, and 8 from the Saxon Engine Works formerly Richard Hartman Co. at Chemmitz.

The engines are built for hauling trains weighing 130 tons at a maximum speed to 60 km. an hour on free stretches with curves of 250 metres radius, and gradients of 5 per cent. and are fitted with vacuum brakes. They are chiefly used for running mixed

trains at a maximum speed of 45 km. an hour and passenger trains at speeds of about 60 km. an hour. The weight of the mixed trains average 350 tons on level lines.

2 B-Passenger Train Super-heater Engines with 3-axled Tender

To keep pace with the rapid increase in weight of fast trains during the period from 1900 to 1910, it became necessary to procure an engine to meet the heavier demands and run more smoothly at high speeds, the 2 B type with Schmidt super-heating system was adopted. In practice, the difference with the saturated steam engine comes to 50 tons more train load for mixed and 40 tons more for fast trains. They are at present serving on the Weltevreden-Buitenzorg and Weltevreden-Tjikampek-Cheribon divisions, at maximum speeds of 75 km. an hour, when relieving lost time.



2 Cl. Express Locomotive No. 701-716 with overheater

2 C 1 Two-Cylinder Super-heater Express Engines with 4-axled Tender

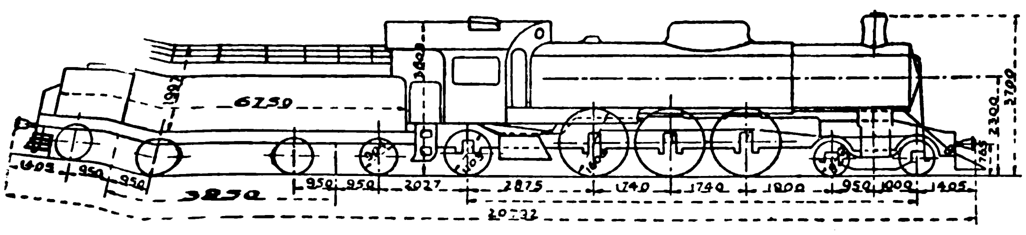
The extraordinary increase in the long distance express passenger traffic induced the design of a more powerful type of engine of whose axles three at least had to be coupled on account of the permissible axle loads. The necessity of extending the large grate transversely, it having already reached considerable length, rendered it impossible to locate the fire-box between the frame-plates, so an Adams radial rear axle became indispensable.

These engines are designed for hauling a train of 300 tons at 33 to 35 per cent. admission maintaining a speed of 65 km. an hour on gradients of 5 per cent. combined with curves of 250 metres radius or the same train-load at a speed of 80 km. an hour on the level. During the years 1911 to 1914, sixteen of these engines were put into service; 7 were supplied by the Swiss Locomotive and Engine Works at Winterthur, and 9 by the Saxon Engine Works formerly Rich. Hartmann Co. at Chemnitz.

The engines were designed in 1915; 16 for hauling trains of 300 tons at a speed of 70 to 75 km. an hour on gradients of 5 per cent. and at 100 km. an hour on level parts of the track, or for trains of 400 tons weight at a speed of 90 km. an hour on horizontal lines. The capacity necessary for these performances would amount to about 1200 I.H.P. with an adhesive weight of 35 tons. During 1919 twelve engines supplied by the Netherlands Engineering and Rolling Stock Manufacturing Works at Amsterdam, were put into service for hauling the express-trains between Batavia and Sourabaya, which often weigh 400 tons on the Batavia-Cheribon division. The engine-frame consists of a combination of plate-frame and bar-frame, which latter form had to be used on account of the cylinders, as these are all four mounted side by side at the same height. The boiler, whose centre-line lies 2300 mm. above the railtop, is fitted with 19 flues of 124/133 mm. diameter, containing super-heater tubes system Schmidt, fit for super-heating to 350 degrees Celsius steam of 14 k.g. per cm.^{2} pressure. An automatic damper is placed in the extended smoke box. The super-heater elements have welded joints. The foremost part of the grate is fitted with a dropping section so that the fire can be easily cleaned. The ash-pan is built extending over and encasing the frame-plates. It is fitted at the sides with adjustable air-holes and with flaps so that it can be emptied by a man standing beside the engine. The four piston valves have a diameter of 200 mm. and narrow rings measuring 6 by 7 mm.; the high-pressure valves having their admission from the inside, the low-pressure piston-valves have double admission on the outside. The L.P. valves are moved by a Walschaert gear, whilst the H.P. derive their movement from the same mechanism by means of a secondary shaft and two cranks. The L.P. cylinders have an automatic bypass, fitted with a valve, which is closed and remains so, whenever fresh steam is admitted into the H.P. steam-chest exerting a pressure on one side of the valve.

When running with closed throttle, this bypass valve is pushed open by the compression of the cylinder. Engines No. 1001 and 1002 are fitted with a three-way cock instead of a draw-gear. etc., by means of which the driver, during the start and whilst running with closed throttle, can open the bypass of the H.P. cylinders, thereby opening a communication between the ends of the H.P. cylinders. When running under steam, on the other hand, the largest surface of the bypass valve is subjected to live steam pressure and interrupts the communication. In the case of engines No. 1003 to 1012, the three-way cock, etc., are replaced by ordinary bypass valves for the H.P. cylinders, which are manipulated by the driver. The cylinder-covers are fitted with self-adjusting stuffing-boxes, Schmidt system. The feed-heater, system "Knorr" with feed water pump, consists on account of the restricted space of two halves placed in series, each of 7 m^2 v.o. The pump has a capacity of 120 litres an hour. In addition to this pump, the engine has also a non-lifting Friedmann-injector, class A. S. Z. No. 9. The feed-heater receives apart of the exhaust steam, the exhaust steam from the vacuum-brake-ejector and from the feed-pump. An automatic arrangement for the feed-heating prevents the feed-pump from pumping cold water into the boiler by admitting extra steam into feed-heaters from the boiler when the engines stands still.

In consequence of the high maximum speed of 100 km. an hour, the following items have been selected with great care, namely: the height of the centre-line of boiler above rail top, viz., 2300 mm., the diameter of the driving and coupled wheels at 1600 mm., the diameter of the engine truck wheels at 825 mm. and the axle-journals of same (130 by 250 mm.), whilst in addition to the complete balancing of the rotary parts 40 per cent. of the reciprocating parts are counterbalanced by weights divided between the wheels

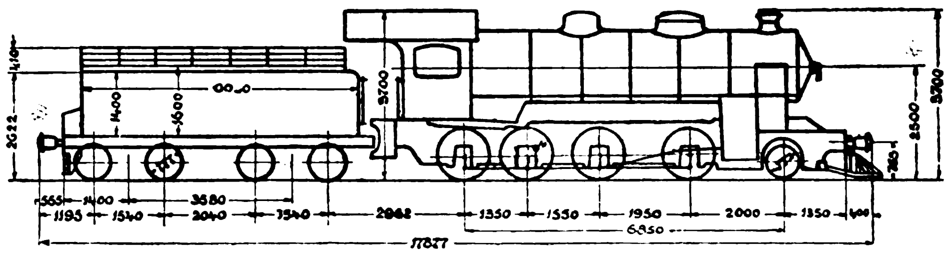


2 Cl. Compound Express Locomotive No. 1001-1012

2 C 1 Four-cylinder Compound Super-heater Express Train Locomotives with 4-axled Tender

The one-day service between Batavia and Sourabaya demands a type of locomotive still more powerful than the 2 C 1 two cylinder engines, in order to increase the maximum allowable speed to 100 km. an hour on the level. Because two large outside cylinders would injure the quiet running at high speeds and furthermore on account of the great difficulties (imposed by the limited axle-load of 12 tons on rail type No. 3 weighing 33, 4 k.g. a metre) to get the required largest available amount of power, it became quite necessary not only to apply super-heating, compounding and feed-heating but also to use more than two cylinders, so the four-cylinder type with inside H.P. and outside L.P. cylinders was chosen.

of the driving and coupled axles. The driving-axle (which is at the same time the first one of the coupled-axles) has crankwebs according to the Frémont system, as a safety-measure against injurious irregularities in the materials strains and stresses. The connecting-rods or main rods are provided with a strap at the big end. The coupling-rod has got fixed bushings which are pushed by hydraulic pressure into the rods. All the metals are lined with babbitt. The mild-steel pedestals or hornplates of the driving and coupled axles have no adjustable wedges or horn-blocks. The journal boxes of wrought mild steel are lined with babbitt on their guiding faces. Further special features are the following: self-registering speed recorders system Hasler, vacuum-brake with ejector of the "Dreadnought" type, steambrake, handbrake (only for the fender) sanders "Gresham and Craven," Zara-throttle, Klinger gauges, safety valves system "Coale" receiver-safety-valves blowing off at 7 k.g. per cm^2., anti-vacuum valves, smoke-consumers system "Marcotty" with flap door fire-brick arches, Friedmann lubricating-pumps, thermo-electric pyrometers system Siemens and Halske, tenders with long filling lids Gölsdorf design.



1 D Freight Locomotive, No 901-929

1 D Goods to Locomotives for Level Lines Twin Cylinder Super-heater Engine with 4-axled Tender

When the 1 C twin and compound engines were superseded by others on the principal mountain lines for a long time shay did duty as goods engines on level lines with gradients of 0 to 5 per cent. until the weight of these trains increased to such an extent that it became regularly necessary to use double traction. This was the case, amongst others, with the "sugar-trains" on the divisions Madioen-Sourabaya and Koetoardjo-Tjilatjap, whilst on the Meester Cornelis-Tjikampek division the traffic gradually became so heavy as to reach beyond the capacity limit of the 1 C engines.

For this reason, a powerful type of goods-engine for use on level lines was ordered, having a separate tender and four coupled axles. Six of these engines were supplied by the Hanover Engine Manufacturing Co., Ltd., late George Egestorff of Hanover-linden. Six by the Saxon Engine Factory, formerly Eichard Hartmann of Chemnitz, 12 by the Swiss Locomotive and Engine Factory "Winterthur," and 5 by the Amsterdam Engine and Railway-material Factory. The 29 engines were put into service during the years 1914 and 1915. They are designed for a maximum speed of 50 km. an hour, for curves with a minimum radius of 150 metres, allowing 29 mm. enlargement of gauge, and for those with a minimum radius of 120 metres, having 30 mm. gauge enlargement.

The engines are at present being used on various divisions with maximum gradients up to 5 per cent., and on which maximum train loads of 800 to 1,000 tons are transported (in the case of night goods trains up to 1,400 tons), whilst on the Batavia-Buitenzorg division, on those parts with continuous gradients of 12.5 per cent., mixed trains can take 350 tons in good weather (the maximum is 280 tons for faster trains). In the fast-train service, speeds of about 60 km. an hour are reached; for want of powerful fast-train engines, the 1 D locomotives have temporarily been hauling fast trains also on the Batavia-Buitenzorg division. They are also suitable for service on mountain-lines where the gradients are not too steep, for instance on the division Poerwakarta-Padalarang, therefore they form a useful reserve for occuring double traction at dividing stations where mountain and level lines meet.

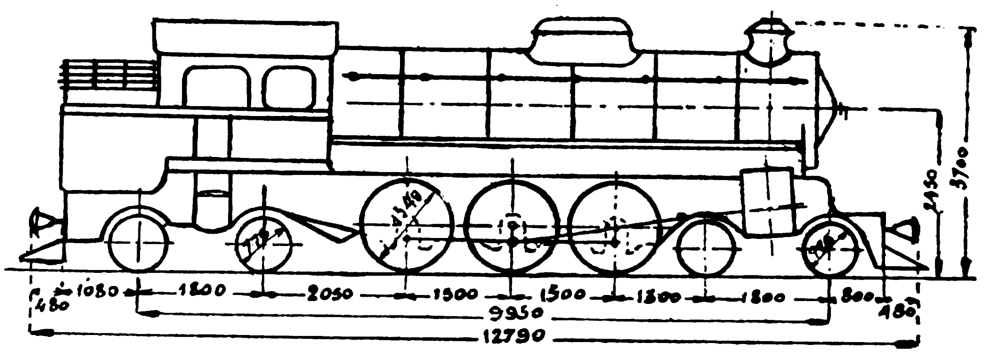
They have proved themselves to belong, within fairly wide limits, to the most efficient types of modern engines.

2 C 2 Twin-cylinder Tender Super-heater Engines

In order to cope with the heavy traffic on the Batavia district railways in an up-to-date manner, special tender-locomotives were ordered in 1916, which had to fulfil the following principal specifications :—

(1) to start and to stop quickly and often; (2) to be able to run backwards quite as well as forwards, in order to prevent waste of time in turning at the termini; (3) to be able to carry the largest possible supply of water and fuel, so as to reduce to a minimum the time required for taking in water and fuel at the termini and (4) to have a maximum speed of 80 km. an hour for running fast trains over moderately long distances, for instance from Batavia to Buitenzorg and *vice versa.*

In connection with their running on rail type No. 2 (25 kg. per m.), the 2 C 2 engines are designed of 300 tons at a speed of about 50 km. an hour for serving trains with an adhesive weight of 33-ton on gradients of 5 per cent. and on curves having a radius of 180 m. with 20 mm. gauge enlargement. The normal speed on the level amounts to 60 km. an hour. Furthermore the engines will have to be able to take without difficulty curves having a radius of 125 m. with 20 mm. enlargement of gauge. These engines were supplied by the "Swiss Locomotive and Engine Factory" at Winterthur.



2 C 2 Local Train Locomotive No. 1101-1114

Narrow-gauge Engines

On the subject of locomotives for tramlines with a narrow gauge of 600 mm., we can only say in passing that the C engines with flue super-heaters have given great satisfaction, and that the powerful D engines for the same gauge are partly constructed on the "Klien-Lindner" principle with hollow driving-axles, and the rest are provided with two "Gölsdorf" axles in both cases the front and back coupled axles to allow for easy running through sharp curves.

MOUNTAIN LOCOMOTIVES

C Fox Walker Tender Engines

The first three mountain engines were supplied by Fox Walker & Co., of Bristol, for the building of the Sourabaya-Pasoeroean-Malang line in 1878. They are designed for running light trains on mountain lines with maximum gradients of 40 per cent. and on curves having a minimum radius of 100 m. They are only used now as shunting-engines in one or another of the large harbor yards.

1 C Twin-cylinder Tender Engines

When a beginning was made with the construction of railways on a large scale in West Java it became necessary to order a type of engine destined for the future regular service. The Saxon Engine Factory (late Richard Hartmann Co., Ltd., of Chemnitz) supplied a very sound and simple type of engine which is still rendering excellent service. In the course of the years 1879 to 1891, forty-eight of these engines have been put into service.

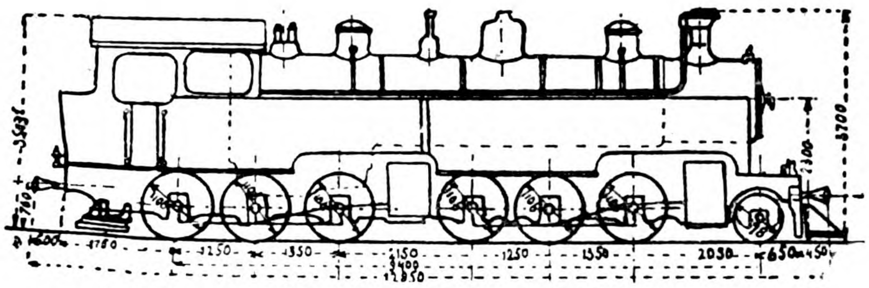
1 C Two-cylinder Compound Tender Engine

The application of the compound system was of great importance to the East Indies, and in the period from 1892 to 1902, a total number of 83 1 C two-cylinder compound locomotives were purchased from the Saxon Engine Factory, late Richard Hartmann, of Chemnitz.

B + B 1 Four-cylinder Compound Mallet Engines

It became necessary to construct a more powerful engine than the 1 C type for the mountain lines, resulting in ordering 16 B + B 1 Mallet four-cylinder compounds, of which 12 were supplied by the Saxon Engine Factory, late Richard Hartmann, of Chemnitz, and four by the Berlin Engine-Building Co., late L. Schwarzkopff: eight of these engines were put into service in 1900, four in 1907, and four in 1908.

These engines are serving on the Buitenzorg and Padalarang division where the traffic is moderate and the maximum gradients 40 per cent. and 25 per cent., and where the curves have a minimum radius of 150 m. On the 40 per cent. gradients, two engines are used, whilst the maximum train-weights for 25 per cent. gradients amount to 110 tons for fast trains and 130 tons for mixed and goods trains.

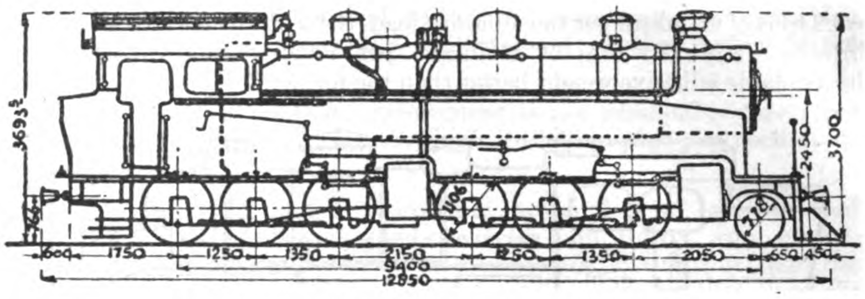


1 C + C Large Mallet Type Tender Locomotive No. 521-543

1 C + C Mallet Four-cylinder Compound Locomotive

Four years later even more powerful locomotives became necessary for the Poerwakarta-Padalarang and Tjitjalengka-Bandjar mountain lines, The 1 C + C type was chosen, and 34 engines put into service up to 1911. The Saxon Engine Factory (late Richard Hartmann of Chemnitz) supplied the first 13, with a repeat order of four, the Berlin Engine Building Co., Ltd. (late L. Schwarzkopff), of Berlin, supplied six, and the Netherlands Machine and Railway-material Factory of Amsterdam, the last batch of 11. They were to run at a speed of 40 km. an hour, and on curves of 150 m. radius. The presence of a leading radial axle and the much larger total wheelbase of the front truck have exercised a very favorable influence upon the wear and tear of the front driving-axle's flanges and also upon the very steady running at comparatively high speeds as compared with the B + B 1 type.

The engines are at present serving, amongst others, on divisions having gradients of 25 per cent. and curves with a minimum radius of 150 m. and are capable of hauling on those gradients, fast trains of 160 tons at a speed of about 31 km. an hour, and mixed and goods trains of about 180 tons at about 25 km. an hour; maximum speeds of 45 km. an hour are admissible without causing any difficulty.



1 C + C Large Mallet Type Locomotive No. 551-561

1 F 1 Twin-cylinder Super-heater Engine

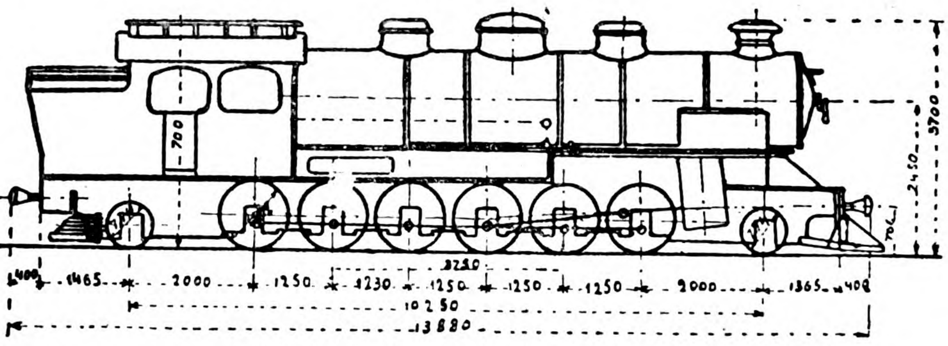
The first 1 F 1 locomotive whose wheel arrangement was called by the manufacturers, the Javanic type, was placed in operation on the western lines as early as 1912. Since that time 23 engines of this type have been supplied, 16 by the "Hanover Engine-Building Co., Ltd., late George Egestorf, of Hanover-Linden; and seven by the Netherlands Engine and Railway-material Factory of Amsterdam. They are designed for running at a maximum speed of 50 km. an hour on curves of 150 m. radius, with at least 20 mm. enlargement of the gauge. The boiler is fitted with a super-heater, Schmidt system with 18 flues of 124 to 133 mm. diameter, and with automatic superheater damper in the smoke-box; the superheater pipes have got welded heads "Thyssen" system. The frame-plates are 23 mm. thick and well stiffened transversely. The front and middle water-tanks with strengthened top-plates are situated between the rear water-tank and the coal-box at the back above the frame-plates. In this manner a water-supply of 8.5 $m.^3$ is obtained without impeding the outlook of the driver and stoker.

The front and rear trailing-axles are of Adams type, designed with a radius of 2,400 mm., with centering springs giving a maximum centering force of 1,200 kg. The lateral play in either direction amounts to 100 mm. The axle-boxes are of cast steel fitted with wrought steel sliding plates under the hardened, mild steel sliding shoes. These are constructed in such a manner that oblique positions will not cause any chafing or gripping between shoes and the sliding-plates, whilst a plentiful lubrication has been provided for.

The first and last one of the coupled axles are so-called Gölsdorf axles which have a lateral play of 30 mm. on either side in the bearings. In this way the fixed wheelbase is diminished to 3,750 mm. Easy running through curves of 150 m. radius is moreover guaranteed by turning the flanges of the two middle axles (the driving-axle and the next coupled-axle) 4 mm. thinner. The Gölsdorf axles are fitted with coupling-rods having vertical and horizontal hinge bolts, whilst the coupling-rod brasses are designed according to the "Hagans" system with universal joint. The springs are joined in pairs by equalizer's, that is, those of the leading trailer to the first coupled axle those of the 2nd coupled-axle, to the driving-axle; the fourth to the fifth coupled-axles also whilst the load on the 6th coupled-axle is equalized with that of the rear trailer. The regulating of the axle loads is done as if the engine were carried on four (double) axles. The trailing axles springs bear by means of supports on the top of the axles boxes.

The outside cylinders have piston-valves 200 mm. in diameter of the model of the Prussian state railways with narrow rings of 6 + 8 mm. "Robertson" system and single admittance driven by a "Walschaert" gear. The cylinders have bypass cocks which are manipulated by the driver by means of handles and levers the cylinder covers are fitted with self-adjusting stuffing-boxes of the Schmidt system, and with safety and relief valves. The engines are able to haul mixed and goods-trains of 230 tons on gradients of 25 per cent. In comparison with the 1 C-C Mallets which haul only 180 tons with an adhesive weight of 55.965 tons resulting in $\frac{180}{55.965}$

=3.2 tons of trainload per ton adhesive load, the 1 F 1 locomotives, drawing $\frac{230}{62.3}$=3.7 tons of trainload per adhesive ton utilize the available adhesive weight better than the former.



1 F 1 Tender Locomotive No. 801-823

1 D + D Mallet Four-cylinder Compound Superheater Engine with Separate Tender

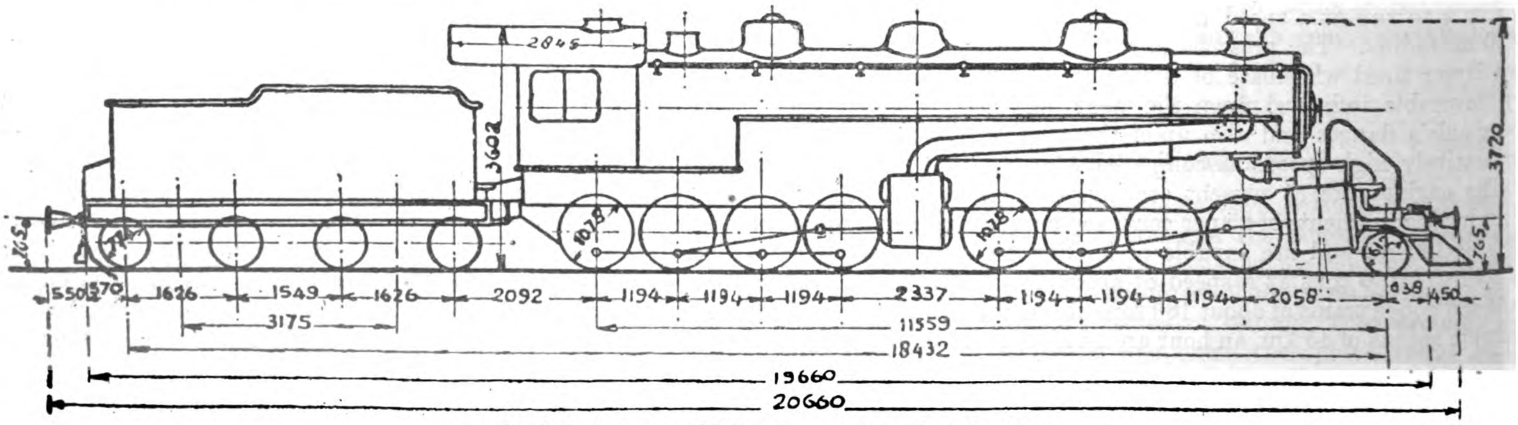
The development of the passenger and goods traffic on the mountain lines increased by such leaps and bounds, that it became necessary, in order to avoid regular double traction, to design a type of engine which should be still more powerful than the 1 C + C and the 1 F 1 type, especially as the 1 F 1 type caused difficulties in connection with the small radii of the Preanger lines, on account of the wear of the flanges. Since in addition the maximum axle-load for the existing lines was limited and for other reasons the choice could not fall otherwise than on the mallet type, because only with this type could the number of adhesive-axles be increased in a rational manner above the limit of six whilst retaining sufficient pliability in curves.

In ordering the 1 D + D type with an average load on the coupled axles of 10.5 tons for rail No. 2, the utmost which can be reached with a gauge of 1,067 mm., was very closely approached, taking into consideration the available gauge limits and the limits fixed by the weight-arrangement. The 1 D + D locomotives were ordered in 1916 and eight were supplied within six months by the American Locomotive Co. They are the first engines of American make which the state railway has employed, and display the typical peculiarities of the land of their origin. Unlike the other mountain-line engines, they have a separate 4 axled tender with a watercapacity of 20 m.^{3} and a coal capacity of 8 tons. The bar-frames of 89 by 89 mm., are stiffened transversely in various places with cast steel parts, whilst large, cast iron steam-chests form the inter-connection between the cylinders. There are wedges to the driving and coupled axle-boxes. The main-rods have adjustable brasses, the side rods, on the other hand, have pressed in bushes. The front trailer forms part of a bogie-system with cradle suspension and has got a radius of 1,295.5 mm. All the springs of the front and back frames are interconnected by means of equalizers.

The outside high-pressure cylinders of 445 mm. diameter have got piston-valves with rings 5-8-in. wide and 3-4-in. thick. The outside low-pressure cylinders have got sliding valves balanced by means of balance strips and a diameter of 711 mm. The valve motion gear is in accordance with the Walschaert system the gear of the two pairs of cylinders being interconnected in such a way, that increase (or decrease) of admission into the h.p. cylinders involves increase (or decrease) of admission into the l.p. cylinders. The boiler, fitted with a Schmidt super-heater for temperatures of about 350° C with 24 flues of 128 to 137 mm. diameter and automatic damper shutters in the smoke-box, is well supported in the middle part by the saddle between the h.p. cylinders, and a sliding support near the fire-box as well, whilst the front support is obtained by a strongly constructed bearing saddle against which the centering springs press.

The smoke-box is arranged in American style. Only the l.p. cylinders have got an automatic by pass valves with differing face areas. The steam-chest pressure works on the smaller surface, the outside air on the larger one, by which means when running under steam, the bypass is shut off, whilst when running with the throttle closed, on account of the vacuum in the l.p. steam-chest, the discvalves are moved by the outside air causing the steam-ports to be interconnected. Another peculiar feature is the intercepting valve situated in the h.p. cylinder casting. It has for its object, to admit live-steam of reduced pressure into the receiver-chamber at starting, to shut off this chamber from the h.p. exhaust, and to allow the direct exhaust of the h.p. cylinders into the outside air. For that purpose the apparatus consists principally of three valves, namely, (1) a reducing valve, (2) an intercepting valve, and (3) a auxiliary exhaust valve. At starting, the mechanism acts entirely automatically, with the exception of the auxiliary exhaust valve which, in special cases, is manipulated from the cab by the engine-driver (for instance in case there is anything wrong with one or more of the steam cylinders so that they have to be shut off or, in case an increase of tractive power becomes necessary for a certain time at starting or when running at very low speed).

In addition to the possibility of obtaining single action of both high-pressure and low-pressure cylinders the intercepting valve, in order to increase the starting power, is designed in such a manner that it only opens at an exhaust-pressure of the h.p. cylinders equalling 30 per cent. of the boiler-pressure and also when the admission pressure for the l.p. cylinders exceeds 40 per cent. of the boiler pressure. The engine is further more fitted with an electric head-light of Pyle's national system, with a small, directly connected turbo-generator. The eight engines are now serving on the division Poerwakarta-Padalarang and haul fast train weighing 300 tons on a gradient of 1-65 at an average speed of 38 km. an hour and also mixed and goods trains of 450 tons at an average speed of 29 km. an hour, developing an estimated power of about 1-300 i.h.p. They pass the curves very steadily and are in this respect beneficient for the line. In consequence of the pressing needs of tractive power on the Bandoeng-Bandjar division, another 20 engines of this type have been ordered, with a few improvements which were considered desirable (stronger frames, automatic stoking, etc.)



1 D + D American Mallet Locomotive No. 1201-1208

Report of the Wood-Forbes Mission

(Continued from page 797)

of funds. The completion of these projects is of the utmost importance and it is an encouraging sign of progress that they have advanced as far as they have.

There are now 2,920 miles of roads rated as first-class in the islands and 7,500 permanent bridges and culverts. The standard, however, of first-class roads has been lowered and we found many roads rated as first-class which are not so. There was an earnest effort made by the government to hurry through deferred repairs in order to prepare the roads for inspection.

During the earlier periods a system of road construction and maintenance was adopted and consistently followed. All structures on first-class roads were reinforced concrete and a standard system of road construction adopted suited to the traffic. Although the work progressed slowly, it was thoroughly well done, adequate provision being made for constant maintenance by a force of laborers. The result was that the road service reached a high degree of perfection, comparing favorably with the roads of any other country and much better than most roads in America. The terrific force of the torrential rainfall in these islands made these precautions necessary.

We have to record that this system has not been consistently maintained ; the roads are falling into disrepair, some are impassable and the system of maintenance is carried on spasmodically. In certain districts money has been spent for new roads instead of keeping up the old ones, which is unwise. We also regret to say that a tendency has crept in to revert to the old practice of building bridges and other structures, of wood, and a uniform policy of permanent construction has not been maintained. This practice, in the long run, is poor economy. Heavy trucks have been purchased for carrying passengers and freight, and regular routes have been established on the highways. These trucks, in some cases, are much heavier than the roads were designed to carry, and much of the deterioration noted is attributable to this fact. The maintenance service should be restored to old standards and the weight of the roads regulated, and standard sections strengthened to enable the use of heavier vehicles.

The roads are, at first sight, good at the present time, but a great proportion of the wearing surface has been worn off without replacement.

In the mountain province and non-Christian provinces we find that the service of maintaining the roads and trails has been neglected, but it is believed that a better organization can remedy these defects without the necessity of additional revenues.

Government in Business

The government has entered into certain lines of business usually left to private initiative. Among these can be cited the National Bank with disastrous results, the purchase of the Manila Railroad Company now operated at a loss, also the National Development and National Coal Companies, etc. At the request of the mission a thorough examination of the Manila Railroad Company was made by competent army engineers whose report is among the exhibits. In our judgement the government should, as far as possible, get out of and keep out of such business.

General Conclusions

We find the people happy, peaceful, and in the main prosperous, and keenly appreciative of the benefits of American rule.

We find everywhere among the Christian Filipinos the desire for independence, generally under the protection of the United States. The non-Christians and Americans are for continuance of American control.

We find a general failure to appreciate the fact that independence under the protection of another nation is not true independence.

We find that the government is not reasonably free from those underlying causes which result in the destruction of government.

We find that a reasonable proportion of officials and employees are men of good character and ability, and reasonably faithful to the trust imposed upon them; but that the efficiency of the public services has fallen off, and that they are now relatively inefficient, due to lack of inspection and to the too rapid transfer of control to officials who have not had the necessary time for proper training.

We find that many Filipinos have shown marked capacity for government service and that the young generation is full of promise; that the civil service laws have in the main been honestly administered, but there is a marked deterioration due to the injection of politics.

We find that there is a disquieting lack of confidence in the administration of justice, to an extent which constitutes a menace to the stability of the government.

We find that the people are not organized economically or from the standpoint of national defence to maintain an independent government.

We find that the legislative chambers are conducted with dignity and decorum and are composed of representative men.

We feel that the lack of success in certain departments should not be considered as proof of essential incapacity on the part of Filipinos, but rather as indicating lack of experience and opportunity, and especially lack of inspection.

We find that questions in regard to confirmation of appointments might at any time arise which would make a deadlock between the governor-general and the Philippine senate.

We feel that with all their many excellent qualities, the experience of the past eight years, during which they have had practical autonomy, has not been such as to justify the people of the United States relinquishing supervision of the government of the Philippine Islands, withdrawing their army and navy, and leaving the islands a prey to any powerful nation coveting their rich soil and potential commercial advantages. In conclusion, we are convinced that it would be a betrayal of the Philippine people, a misfortune to the American people, a distinct step backward in the path of progress, and a discreditable neglect of our national duty, were we to withdraw from the islands and terminate our relationship there without giving the Filipinos the best chance possible to have an orderly and permanently stable government.

Recommendations

1. We recommend that the present general status of the Philippine Islands continue until the people have had time to absorb and thoroughly master the powers already in their hands.

3. We recommend that the responsible representative of the United States, the governor-general, have authority commensurate with the responsibilities of his position. In case of failure to secure the necessary corrective action by the Philippine legislature, we recommend that congress declare null and void legislation which has been enacted diminishing, limiting, or dividing the authority granted the governor-general under act of congress No. 240 known as the Jones bill.

3. We recommend that in case of a deadlock between the governor-general and the Philippine senate in the confirmation of appointments that the president of the United States be authorized to make and render the final decision.

4. We recommend that under no circumstances should the American government permit to be established in the Philippine Islands a situation which would leave the United States in a position of responsibility without authority.

The Far Eastern Review

SHANGHAI, DECEMBER, 1921.

Zones of Strategy

IT is difficult at this time to forecast all that the Pacific conference will bring forth. We are informed that Japan will accept the American proposal for the limitation of naval armaments, and the Anglo-Japanese alliance will give place to a new quadruple entente in which America, Britain, France and Japan will guarantee the peace of the Pacific. This much seems assured.

The most important fact disclosed by the conference leaders is embraced in the explanation given by Mr. Balfour of Britain's reasons for demanding the Kowloon lease in 1898. "*Without the leased territory Hongkong would be perfectly indefensible; at the mercy of any enemy with modern artillery.*" Which means, that any enemy could violate the neutrality of China with impunity and from the Kowloon hills bombard Hongkong and force its capitulation. To our recollection, this is the first time that a British statesman has so openly defined the vital necessity which compelled his government in 1898 to forcibly extend its authority over Chinese territory. It will interest Americans to know that altogether apart from the basic strategic reasons arising out of Britain's fear at that time of Russia and France, American infringement of China's neutrality provided the immediate provocation for Britain's agression in Kowloon. When war with Spain was declared on April 20, Dewey's squadron laid at anchor in Hongkong harbor, feverishly coaling for a long cruise. It was not until April 25 that the squadron left Hongkong for Mirs Bay, about fifty miles distant in Chinese territory, remaining there until mid-day of the 27th before starting on its eventful voyage to Manila. Technically, there was no violation of China's neutrality, as the squadron did not exceed its twenty-four-hour privilege, but the incident brought forcibly home to the British military authorities the vulnerability of Hongkong in the event an enemy might land in Chinese territory and lay seige to the rock from the Kowloon side.

The real justification, however, arose from the fact that Li Hung-chang and Chang Ing-huan had accepted Count Witte's bribes of 500,000 and 250,000 roubles respectively and sold China into an alliance which presented Russia with an ice free port on the Pacific and facilitated her designs on India and Britain's position in Eastern Asia. This was the beginning of China's troubles, the key to every move made on the Far Eastern chessboard right down to the imposition by Japan of the twenty-one demands. Mr. Balfour emphasized officially the previous utterance made by Sir John Jordan before the China Society, to the effect that "nearly all the trouble that has arisen in China since 1895 was due to Li Hung-chang's diplomacy." If the world would seek to understand all that these quiet diplomatic statements imply, and would analyze the incidents one by one that followed the signing of the Li-Lobanoff treaty of alliance and the entrance of Russia into Port Arthur and South Manchuria, a flood of light will be thrown on moves which have been interpreted as wilful aggressions upon China's sovereignty. If we will keep these facts always before us, the so-called "spheres of interest" in China alleged to have been designed for commercial exploitation, will shape themselves into zones of strategy, created by various powers to protect their territories against the ever onward march of Russia.

The sledge hammer blows which cracked the hoary old empire into so-called spheres of interest in 1898, were the logical aftermath to Li Hung-chang's *laison* with Russia, and precipitated by China's breach-of-faith with England in the Peking-Hankow railway deal which enabled Russia to evade her understanding with Great Britain and carry her that much nearer her coveted goal on the northeast frontiers of India. The British ultimatum to China demanding compensation for this breach-of-faith is the key to British policy, giving the direct lie to all that has been written about the establishment of spheres of commercial influence, and closing the door to the trade of other nations in the Yangtze valley. This ultimatum is the most concise and emphatic document on record in diplomatic intercourse. "*You are authorized to inform the Tsung-li yamên that unless they agree at once (to the demands for compensation) we shall regard their breach of faith concerning the Peking-Hankow Railway as an act of deliberate hostility against this country, and shall act accordingly. After consultation with the admiral you may give them the number of days or hours you may think proper within which to send their reply.*" There can be no misinterpretation of this message from Downing Street to the British minister at Peking. It says in plain words that China had committed a hostile act against Great Britain, and this can only be interpreted that the British government was fully informed as to the working of the Li-Lobanoff alliance and Russia's object in furthering her advance upon India through the territories of her dupe. The note breathes the grim spirit of the Anglo-Saxon to resort to instant hostilities when their vital interests are placed in jeopardy. There was no trade policy here, no special desire for railway privileges to create markets for British materials, no intention to create a sphere of interest in order to keep other nations out; simply the common, ordinary prudence of a determined people to protect themselves at all hazards against a sly, and unscrupulous enemy. When these basic facts are driven home to the drivelling sentimentalist, who persists in approaching this problem from the angle of commercialism, the world will begin to understand something of the basic problem of China, an understanding that has been made possible by the clear cut explanation of Mr. Balfour concerning Britain's position in Hongkong and Kowloon.

Every move that has been made since that date (with special reference to railway concessions) was based on strategic reasons, the constant checkmating of Russia working through Belgium or France to cut China in half with strategic railways for the ultimate conquest of India and subjection of Japan. The closing of one section of China after another which followed had no commercial significance. It is only necessary to recall that the last official British utterance on this subject came when Sir Edward Grey made his declaration before the house of commons in July, 1914, that all railways in the Yangtze should be British railways, and the French government a month after the outbreak of the world war, with the Germans at the gates of Paris and the archives of the republic on the way to Bordeaux, forced China to close the province of Kwangsi to all railway construction other than French. Three months later Japan presented her twenty-one demands. At that time China was cut in half north and south and east and west by the Russo-Franco-Belgo combination of railways, a situation that carried an unmistakable menace to Japan and Great Britain. The same principle obtained in the Taonan-Jehol railway, where Japan was forced to demand concessions from China in order to protect herself against the moves of Russia to flank her position through the annexation of Mongolia. The problem of China, reduced to its lowest terms, has been strategical, created by her own weakness and the venality of officials who have refused to see that these moves constituted a menace to the peace of her neighbors.

The sins of their fathers are being visited upon the Chinese of to-day. Young China, the product of American and other Western universities, are paying for the errors and cupidity of a past (and present) generation. They clamor loudly for "justice" but fail to understand that this boon is reciprocal, to obtain which, they must guarantee to other powers that their vital interests will not be jeopardized through China's weakness and disorganization. The highest duty of real friends of the Chinese is to place this truth before them. China's regeneration and restoration to a place amongst the nations must come from within. A strong and united government shouldering its share of the load for the maintenance of Asiatic peace must be established before China can hope to realize its dreams. And, it may be said, that these aspirations will not be advanced when the son of the ruler of Manchuria is caught red-handed evading the law by selling large quantities of arms to the Russians. Li Hung-chang's venality brought China to her present hopeless position. The cupidity of men like young Chang may make it impossible for her friends to protect China from the consequences of these follies. G. B. R.

The Shaw Case

AT the recent convention of the associated British chambers of commerce held in Shanghai, Mr. A. W. Burkill, the chairman, reaffirmed the position of the British commercial community on the Shaw case. After describing the conditions under which Mr. G. L. Shaw carried on his business at Antung, the reasons for his arrest and incarceration by the Japanese authorities in Korea, he touched upon the conflict between British (and American) and the continental system of jurisprudence as adopted by Japan. As Mr. Burkill points out, "the right of one state to try the subject of another state for an offense committed outside its own borders and jurisdiction, involves a legal point of considerable interest. The practice of various countries differs on this point. Some continental countries, including France and Germany, hold that they have the right to try such offenders if once they place themselves within their jurisdiction. Great Britain and America claim no such right, which indeed, adds Mr. Burkill, appears to be repugnant to Anglo-Saxon tradition."

This, in reality, constitutes the issue in Shaw Case. With this exposition of the facts surrounding the clash of jurisdiction, it is clear that as long as these laws are written into the Japanese statute books, their officials have no option other than to carry them into execution, whenever a foreigner, who, in their opinion, has violated these laws, places himself within Japanese jurisdiction. No matter what views other nations may hold as to their jurisdiction in such cases, Britons and Americans cannot be expected to sympathize with such a system, for, under existing conditions of travel and international intercourse, with the main lines of communication across the Pacific passing through Japan or Japanese territory, foreigners are exposed to the application of Japanese law, for infractions committed in their own or other countries.

The case is still *sub-judice*, with Mr. Shaw out on bail awaiting further action on the part of the Japanese authorities. It can be readily understood that the British government will be reluctant to consent to the appearance of Mr. Shaw before a Japanese court and so create a precedent that might have far-reaching consequences. On the other hand, the Japanese government apparently has no desire to press the case and precipitate a crisis in their relations with Great Britain, so a deadlock has been created, which neither side can break without loss of national dignity.

It is to be regretted that Japan's action has been construed as a disguised economical weapon to undermine or drive out British trade in the port of Antung built up largely through the efforts of Mr. Shaw. Mr. Burkill admits frankly that the British attitude on the Shaw incident lays them open to the charge of being anti-Japanese, and he hastens to add :

"We are not anti-Japanese in the sense that we are opposed to Japan's legitimate aspirations. We realize the vital character from her point of view of many of her aims, and we are perfectly willing that she should succeed and prosper in such aims. Both from a political and an economic standpoint we see how much is to be gained from co-operation and compromise and how much there is to lose from mutual jealousies and antagonisms. In a word, we want as far as possible to work with Japan and not against her. Whilst we wish this, indeed because we wish it, we are bound when we think that Japan is acting in a manner inimical to our interests to tell her so. We should be false both to her and to ourselves if we did not. And on the Tsingtao question, in regard to Mr. Shaw, and in the matter of obstructive regulations we think that our criticisms have been justified."

Mr. Burkill took the manly and commenable course in pointing out the reasons for British criticism against Japanese methods. Real friendship for Japan demands such open and frank criticism so the higher Japanese authorities will know what they have to contend with and make the necessary corrections, if corrections are justified.

The recommendation of the British chamber of commerce that Mr. Shaw be brought before a court of competent jurisdiction, and if no charge can be lodged against him, ample compensation be given for the treatment accorded him, seems equitable, and no doubt under ordinary circumstances would commend itself to the Japanese government. This means, however, that Japan must prefer charges and submit evidence against Mr. Shaw in a British court, and expose the working of her secret service in Korea. We are not familiar enough with British law to express an opinion on this, but are certain that such a case could never be brought before an American court. In a country which political refugees, revolutionists and filibusters have used as their headquarters to carry on warfare against other governments, it would be impossible to indict for an allegation of being in sympathy with or aiding and abetting a revolution against the rule of Japan in Korea. We assume the same law principle prevails in Great Britain. If so, it would seem to weaken the recommendation of the British chamber of commerce. If Mr. Shaw is to receive compensation for his sufferings while under arrest in Korea, it would appear that this can come only from a spontaneous recognition on the part of Japan that a mistake has been made. If the British government is adverse to creating a precedent recognizing the jurisdiction of Japan in similar cases, and the Japanese government is reluctant to press a point from which no tangible benefits can be derived, it would seem that a little heart-to-heart talk between trained diplomats, such as cleared the atmosphere for British interests at Tsingtao, might bring results highly gratifying to both sides.

* * *

The Future of Japanese Engineering

IN the event that the proposals of Secretary Hughes materialize into an international agreement for the reduction of naval armaments, the greatest sufferers financially will probably be the Japanese shipbuilders, who, after staggering through the depression of the past two years, will have to face this final knockout blow and go to the wall unless assisted in some manner by their government. The largest of these yards, the Mitsubishi, Kawasaki, Uraga, Fujinagata, Ishikawajima, Yokohama and the Osaka Iron Works will be vitally affected. All of these companies have expanded their capital since the termination of the war, in some instances by absorbing smaller yards who were the first to feel the effects of the depression. They have also extended their plant and looked forward to the distribution of government orders for naval construction. Especially is this so in the case of the two largest yards, the Mitsubishi and Kawasaki, who have repeatedly expanded their plant to take care of the ever-increasing demands for war equipment in addition to their regular commercial business. There is no relief in sight for these larger yards from new commercial shipbuilding, due to the great excess ocean tonnage now lying idle in all ports of the world.

The Yokohama and the Uraga Dockyard Company will be hard hit by the total suspension of warship construction. Since Mr. Hughes' proposal became known, Japanese shipbuilders are greatly concerned about the future of their business and are considering a petition to the authorities for relief. The companies usually have paid money as penalty to the government when they have failed in the delivery of warships at fixed dates. But they will be unable to receive indemnity from the government when the latter discontinues the contracts for warship construction as the result of the enforcement of the navy reduction agreement. Therefore, they intend to petition the government for the payment of money for the discontinuation of its outstanding contracts with them. On the other hand, the government will suffer a huge loss from the waste of various large equipments, including a dock for the building and accommodation of a 40,000-ton ship at the Yokosuka Naval Dockyard.

The warships excepting submarines that have been contracted for with principal private shipbuilders number 30. When divided into various dockyards, they are the battleship *Tosa*, battle-cruiser *Atago*, light cruiser *Natori* and first-class destroyers *Kiyokaze* and *Karukaze* at the Mitsubishi Dockyard; battleship *Kaga*, battle-cruiser *Takao*, light cruiser *Abukuma*, and second-class destroyers *Karukaya*, *Yuri* and *Omodaka* at the Kawasaki Dockyard ; light cruiser *Isuzu* and *Kinu*, second-class destroyers *Hishi*,

Hachisu, *Ayame* and *Botan* at the Uraga Dockyard Company; second-class destroyers *Sumire*, *Moyogi*, *Kakitsubata*, *Tsutsuji Kaido* and *Basho* at the Ishikawajima Shipbuilding Yard; second-class destroyers *Tade*, *Ajisai*, *Shion* and *Nadeshiko* at the Ujinagata Shipbuilding Yard; airplane depôt ship *Hosho* at the Asano Dockyard Company; and gunboat *Nakoso* and special service ship at the Yokohama Dockyard Company.

The effect of depriving these establishments of naval work, must be felt in other directions. Most of these yards already specialize in turning out various kinds of boilers, engines and machinery of all kinds for the domestic market. It is folly to expect that these plants will be scrapped. Deprived of orders for war material, the plants will be converted into factories for producing machinery of all kinds, and with the start they have, in addition to geographical propinquity to the nearby markets of China and Eastern Asia, in time, will become most formidable competitors for the machinery trade. There are many excellent Japanese engineering installations in Japan and China, and it will not take long under the stimulus of competition for Japanese machinery to reach a high stage of efficiency. There are many European manufacturers now co-operating with Japanese for the erection of machinery manufacturing plants, and under such skilled supervision and direction the product will find its way into markets now monopolized by American and European manufacturers. The commercial war for the development of Asia will be intensified, with Japan in the most favorable position. It will come to that. Co-operation with Japan will not be spurned by America's competitors.

* * *

Exports the Salvation of Japan

Governor Inouye's Sound Views

IN the welter of propaganda and flood of articles about Japan and the Pacific problem now filling the pages of American newspapers, comes a concise, sensible statement from the one man most competent to speak on Japan's necessities. Mr. J. Inouye, governor of the Bank of Japan, stands as the foremost authority on national finances and trade, and when he consents to be interviewed, his opinions reflect the views of big business in Japan. Unquestionably, he stands to-day as one of the world's great financial leaders, under whose wise and skilful direction Japan has been carried safely through the period of depression and started along the road towards real prosperity. He recently gave out the following statement to the *Associated Press* :—

"The population of Japan is increasing by 600/700,000 a year, while the production of foodstuffs cannot keep pace with this steadily rising demand. We have at present about 4,000,000 spindles in cotton mills, but not a picul of raw cotton is now obtained in Japan. Our looms are capable of weaving yearly 34,000,000 yards of woolen goods for which no wool is supplied in our land. Again, steel is consumed in Japan to the amount of about 1,500,000 tons a year while the home production of iron ore aggregates not more than 130,000 tons.

"In these circumstances Japan cannot solve this vital question of economic existence without recourse to economic activity abroad. The necessity for activity by the Japanese in settling this question of existence will naturally be admitted by all other nations.

"As has been proved by history the Japanese people are really unfitted for emigration abroad so that it is almost vain to attempt to send the increase of population to other countries. There is, therefore, no way to secure the existence and the maintenance of this nation except through economic activity abroad.

"It is quite natural in this connection that Japan should prefer China proper, Manchuria and Mongolia with which she had had the most intimate relations historically and is also in close touch geographically. Because of this economic activity, however, Japan should not be misunderstood as insisting on exclusive territory, or seeking any kind of territorial acquisition, indeed there is not the faintest shadow of doubt that Japan does not intend to exclude the trade and enterprise of other countries in the matter of trade and commercial competition.

"Japan has sometimes been described as a nation of militarists or as cherishing ambition for territorial acquisition. In seeking the causes of such misunderstandings we must admit that Japan has often fallen into error in the past; she has made no small number of mistakes in her policies in China, in Manchuria and in Mongolia and in doing so has incurred much unfavorable criticism. But now the people of Japan have awakened to the situation and I do not think that Japan will repeat such mistakes in future.

"As stated before, Japan's economic activity must tend not only towards securing an outlet for the production of home industries, but further towards settling the vital question of her future economic existence. Consequently, there may be a difference between the economic activity of Japan and that of other nations in China, but the situation will readily be understood by all the powers.

"It is quite unreasonable to say that Japan intends to exclude other nations from these territories simply because she is driven by necessity to a greater tradal effort therein."

* * *

China's Great Opportunity

Perfect Substitute for Linens Found in China Grass

CALLING it the most perfect substitute ever found for linen, Felix Brecher, who returned to New York recently from a four-month trip abroad, during which he closed negotiations with William Rexroth, said to our correspondent that the newly perfected "solidonia," the proprietary name for the fibre obtained from China grass, is fully equal to linen, not only in appearance, but in absorbing property, strength and durability. He brought with him a wide range of yarns, threads and fabrics, together with collars and shirts made of this fibre.

The entire output of the Furstenberg, Germany, factory of Rexroth, is absorbed at the present by the German linen mills. Mr. Brecher said, but as soon as arrangements are completed on this side the material will also be manufactured in the United States for the domestic mills. No attempt, however, would be made to grow China grass for this purpose in California or any other part of the United States, because it was found that stalk grown by expensive white labor is about twice as expensive as that grown in China, from which country not only the Furstenberg factory is importing all its straw, but eventually the American plants also will obtain their raw material.

He estimated the present capacity of the Furstenberg factory at about 10,000 pounds of decorticated fibre a day, 4,000 pounds of roving and about 2,000 pounds of yarn, the output of the latter being dependent on the fineness of the count. With the machinery built specially for the purpose, yarn up to 100 leas can be spun, he said, and tests showed that the finest fabrics, such as sheers, handkerchief fabrics, dress goods, light cambrics, etc., can be woven of it.

Mentioning a few articles made lately in Germany from "solidonia," Mr. Brecher said that hand towels and dish towels, as well as sewing thread for shoes, were especially manufactured in large quantities. Some of the processes employ noil and waste spin yarn on the woolen or carded system especially for towels. The Furstenberg mill furnishes, in addition to yarns, solidonia roving to such mills as prefer to do their own spinning.

"I am of the opinion that for years to come there will be a scarcity of linen in the world on account of the Russian flax being missed from the markets, and for this reason China grass, which can be had in unlimited quantities, can be considered as the happiest solution of this problem, provided it is developed and treated in the proper manner," said Mr. Brecher.

In commenting on the manufacture of solidonia, he remarked that the problem with China grass was not only to separate the woody matter from the stalk, but especially to take out the resinous matter from the fibres without impairing the strength of the latter. The secret chemical and mechanical processes patented by Herr Rexroth are claimed to be only ones to accomplish this, he said. The machinery specially designed for the mechanical processes are being manufactured by the Saxony Machine Works, in Chemnitz and Dresden.

In conclusion, Mr. Brecher stated that arrangements have been made to bring Herr Rexroth to the United States soon, not only in connection with the contemplated factories for the manufacture of China grass, but also to study American fibres not yet utilized.

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Engineers All

A New International Contract

THE engineers of America, Great Britain and France having fought side by side during the war on the various fronts, are now drawing together in close harmony for the promotion of concord and international peace. In our last number we reproduced the message of the four great American engineering societies to their brothers in Great Britain; below, our readers will find an editorial from the *Mining and Scientcifi Press* which takes up and carries the idea to the point where a new international contact may be established. Modern civilization and industrial progress is largely the work of the engineer. Politicians, statesmen, soldiers, and other leaders, must, in the end, come to the engineer for advice and assistance. He is indispensible to progress; the development of China in the last analysis, rests upon his shoulders. International concord, peace and good-will, are mere words in this part of the world, unless the engineers of America, Britain, France and Japan co-operating with the Chinese, find some common meeting ground and use their combined intelligence and prestige for the development of China along lines that eliminate friction. No matter how unselfishly engineers at home work for a common understanding, their efforts will fail unless upheld by their conferés on the firing line of the struggle for commercial supremacy. No good can come of the movement now gaining headway in the homelands, when engineers who fought side by side in France are transformed into bitter commercial antagonists in the peaceful war for markets. The present tendency of foreign engineers in China to form national associations instead of co-operating as a unit for the advancement of their profession is altogether out of harmony with the spirit of the times. Here is a situation that should be carefully studied by the members of the engineering society of China and the association of Chinese and American engineers, so that some way may be found to amalgamate these two important bodies, so that all can work together for the solution of China's problems and give effect to the pr'nciples so eloquently set forth in the following editorial:—

On October 10 a representative gathering of American engineers gathered at the Engineers' Club of New York to welcome delegates from the principal engineering societies of Great Britain and France. This event celebrated the return of the mission of American engineers that went abroad this summer to bestow the John Fritz medal upon Sir Robert Hadfield of London and M. Eugene Schneider of Paris; it also marked the launching of a movement to promote world-wide unity among the English-speaking peoples and among those who co-operated during the war against Germany. The idea of the movement was born during the war, when British and American engineers shared the perils of the battlefield and worked side by side with the French, particularly at the time when the German armies sought to drive the British under General Haig to the coast and win their way to the channel ports. It is proposed now to establish a new international contact between engineers on the two sides of the Atlantic, with a view to promoting concord between English-speaking countries, to advance the art of engineering, and to work along conservative lines for the establishment of international peace. The gathering on October 10 is expected also to mark the recognition of the engineer as a factor in constructive national and international policies as well as in the technical field to which he is particularly devoted. It is proposed to establish "a new international contact which shall promote concord among the English-speaking countries, advance the science of engineering, and work along conservative lines for the establishment of international peace." Never was a more worthy purpose announced; gentlemen, go to it, the profession that you represent so worthily is with you, heart and soul. Such a purpose should find support not only among Americans of colonial stock but among all intelligent and serious-minded citizens. We can imagine that it will make its appeal to German-Americans and others whom it is necessary to describe by means of a hyphen, for the movement is not political nor racial; it is the "peoples" that speak English that are asked to co-operate in furthering goodwill, not for political or economic aggrandizement, but to further the ultimate end of civilization, which is to promote the art of living in peace and plenty. Engineers—especially those devoted to mining—are nomadic persons, they make the whole world their field of action, and as travelers, more particularly in the countries where their own language is spoken, they should serve as excellent missionaries in behalf of a greatly useful idea. In a letter to Sir Robert Hadfield, Mr. Calvin W. Rice said: "We, as professional men, must not only have before us the highest ideals of the engineering profession but we must become internationally minded to the end that the peoples of all nations may be joined in the ennobling concept of a common ideal for all professional men throughout the world. It is not necessary to wait for leagues of nations to be consummated, and international tribunals to be effected, before practising what we preach in regard to peace." Nor need we wait for the disarmament conference in order to disarm ourselves of sundry provincial prejudices that stand in the way of such co-operation. Already we have set an example in our relations with our good neighbors, the Canadians. If two energetic and competitive peoples such as the American and Canadian can live side by side in amity and goodwill, then surely it may be hoped that other nations—all nations—will do the same eventually.

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Labor Unrest in China

By T. A. Chen, M.A.

Immediate Causes of Labor Unrest

(U.S. Department of Labor Report)

THE high cost of living is working havoc among the teeming millions of China. In the north, approximately five provinces, are suffering a great shortage of food. In central and south China, rice has become a very expensive commodity, costing between $12 and $17 a picul. Before the war, eggs in Ichang, Hupeh, cost 4.5 cents a dozen; to-day they cost at least 10 cents, an increase of more than 100 per cent. The dwelling houses in Shanghai, with two rooms on the ground floor and two more on the floor above, now rent at from $240 to $360 per year, and there has been an increase in rent of about 150 per cent. in two years. The woman workers of the American-British Tobacco Co., of Pootung, recently went on strike on the very issue of the high cost of living, alleging that the introduction of a new system of packing cigarettes would adversely affect their wages, thereby necessitating a lower plane of living. Again, though prior to the Shanghai carpenters' strike of June 12-16, 1920, the employers had given an explicit promise to raise wages within 12 months, the workers declared that the steady mounting of retail prices would not permit them to wait, and immediately resorted to direct action.

The precariousness of the situation is aggravated by bolshevist propaganda. Sporadically, radical doctrine had crept into university lectures; but its penetration into Chinese industries was not

definitely manifested until the ninth anniversary of the Chinese republic, October 10, 1920, when the bolshevik agents in Shanghai issued circulars informing their Chinese comrades: (1) That the Peking government, being in the hands of the capitalists, was oppressive to the masses; (2) that in bolshevism the workers would find the only object worth living for; and (3) that the people of Russia had already achieved this object after three years' vigorous struggle. Quietly and steadily this force has been gaining a foothold in the rank and file of labor. In February 1921 the Chinese chargé d'affaires in Denmark, who was then well informed on the Russian situation, advised Peking of the broadcast propaganda of the Moscow society in Tientsin, Shanghai, Hankow and Canton. A few weeks later Peking residents were startled by motor cars flying a red flag with a star and the letters F.E.R. (Far Eastern Republic). Thereafter the Chinese government felt it necessary to take precautions against lectures on communism and *pseudo*-welfare speeches delivered at mining camps and industrial centres ostensibly for the benefit of the workers.

Furthermore, the mushroom growth of home industries has called for an increased supply of labor. Within the last two years there have sprung up in the Yangtze valley 53 factories, 26 electric plants, 18 transportation companies, 16 cotton mills, 16 agricultural enterprises, 15 commercial houses, 12 mining companies, 3 fisheries and 8 miscellaneous companies—aggregating a total investment of $74,187,470.

Underlying Causes of Labor Unrest

About one-fourth of the Chinese population must earn its living by skill or by mere physical strength. For many years this class has been subject to economic exploitation by the landowners, capitalists and middlemen.

High rates of interest and high rents in rural communities work hardship on the agricultural laborer. The landowner usually exacts from 13 to 20 per cent. interest on his loans and charges about the same rate of interest on mortgages. In hiring a helper, the farmer has to take this excessive rate of interest into account, especially if he himself is in debt, and so he feels it necessary to keep the wages down. A farm helper rarely gets more than 25 cents a day, plus board and lodging. Besides regular work on the farm, he attends to such odd jobs as drawing water from the well or getting fuel for the kitchen. Rent also is high. The tenant pays the owner from 1.4 to 1.8 *tan* per *mow*, out of an annual yield of from 3.2 to 3.8 *tan* per *mow*, or about 46 per cent. of the gross produce. The amount the mortgagor-farmer pays in interest to the mortgagee and wages to the helper (if any) amounts to the same as the tenant pays to the landowner. The laborer lives from hand to mouth. The small farmer can save little. The wealth seems to concentrate in the hands of the landowners. There would appear to be no promise of economic prosperity for the small farmer or the worker, unless the rate of interest is made materially lower by the introduction of some such plan as the rural credit system in the United States.

The city worker, in some cases, is in no better position. Take the rickshaw coolies of Shanghai, for example. They number about 35,000 in all, and their work is divided into day and night shifts. For the privilege of rickshaw pulling, a license is required, covering one of the three routes; for the whole city the license costs $5; for the French-Chinese section, $3; and for the Chinese section, $1. This fee is paid by the owners, who have organized themselves into the rickshaw association. The agents of the association then rent the rickshaws to the coolies at various rates. For the whole city, each rickshaw is rented at 85 cents a day, of which 70 cents goes to the owner, and the remaining 15 cents to the agent; for the French-Chinese section, it is rented at 52 cents, of which 40 cents goes to the owner and 12 cents to the agent; for the Chinese section, it is rented at 36 cents, of which 30 cents goes to the owner and 6 cents to the agent. The coolie then assumes all the risk of making a sufficient daily wage to keep himself, after paying this high rate of rent. As a result, the daily wage varies from 45 to 85 cents, or about the same as the owner of the vehicle gets. Occasionally, he may get two or three dollars a day. But rickshaw pulling requires much physical exertion, and an average person cannot stay in the trade in vigorous health for more than ten years.

The case of the Shanghai maidservants illustrates another underlying cause of unrest—the usurious share of wages demanded by the middleman. As these women come from Soochow, Yangchow and Anching and have no homes in the city, their employment is usually obtained through a private agency, similar to an employment bureau. The agent makes arrangements with the employer and then recommends the maid. If the three-day trial proves satisfactory, the agent closes a contract with the employer and demands an exorbitant charge for his services. As long as the servant works the agent deducts 20 cents from every dollar she gets, and obtains another 20 cents from the employer for every dollar he pays to the maid. The middleman thus robs both the employer and employee, but the latter suffers most bitterly.

While these cases are not universal, they clearly indicate labor's inability to get an equitable reward for its share in production

The workers are further burdened by large families. The 1910 estimate of the *Ming-chen-poo* (ministry of the interior) conservatively puts the average number of children per family in China proper at 5.5 and in Manchuria at 8.3. Taking the daily wage of an average factory worker at 45 cents and striking off 5 per cent. for such luxuries as tobacco and tea, he has 42.5 cents left on which to feed himself and his family. Even though his wife does some sewing and his children do some light work at the factory, it is impossible for the family to live decently.

Manifestations of Unrest.—Strikes

In industries where the workers are well organized, their discontent as to conditions of employment is expressed through the strike. On March 3, 1921, the whole force of the French tramways in Shanghai went on strike, having made eight demands. The strike lasted four days, and on the fifth day the workers resumed their work, with the definite understanding that the wages would be raised 20 per cent. as demanded.

Another important strike was that of the Shanghai carpenters, June 12 to 16, 1920.

The contagious strike spirit, now so generally prevalent in China, was quickly caught by the prison laborer, and the first "hunger strike" occurred in Shanghai not long ago.

On March 14, 1921, 1,500 teachers in eight government schools in Peking went on strike, leaving 40,000 students without instruction. They demanded that back salaries to the amount of over $400,000 be paid immediately, that salaries be increased, and that a change of government policy regarding appropriations for public education be made.

Agitation

In industries where the strike has not been used, trouble has been brewing unseen. For a long time there has been agitation for increase in wages.

Within labor organizations agitation for better working conditions is, in a large measure, dependent upon the boss or head man. The personality of the head man is usually of a forceful type and he possesses a high degree of shrewdness and unusual power of persuasion. Since many workers are illiterate, they rely upon him for information about wages, hours of work, and conditions of employment. The unquestioned confidence of the workers in the head man assures him always of a loyal following in whatever course he may take. Thus, the Hongkong strike of April 1920, which involved 9,000 workers and was a gigantic protest against indequate pay, was started by a handful of labor "leaders" who may be accurately described, in western terminology, as "professional agitators."

Part of the labor agitation in China is carried on voluntarily by the liberal press and the National Students' Union. The press, voicing as it does the more enlightened sentiments of the nation, is sympathetic toward labor. The students consitute a formidable force, as illustrated by the nation-wide protest against the Versailles award of Shantung to Japan. Both are fighting labor's battle, partly because they believe that labor should not be sacrificed to further the capitalist's ambitions, and partly because they consider labor too weak to enter the contest single-handed.

One important phase of the agitation touches the present social renaissance in China. The development of industries has opened to women many vocational opportunities. In fact, some banks and trade corporations in Shanghai are encouraging woman workers to become bookkeepers and accountants by offering them pay equal to that of male workers in the same occupations.

But the emancipation of women has on the one hand intensified labor competition and on the other hand stimulated public agitation for the worker's health and safety. Recently the press of Changsha (Hunan) and of Shanghai fought vigorously against the recruiting of female employees by the Hou Sen cotton mill of Shanghai. Though the employer declared that great economic distress in the province had prompted him to offer the contract as a partial relief for the poor, the press immediately opposed the employment of women as an indication of capitalistic exploitation. Chinese society, it argued, cannot tolerate the enslaving of a large number of women merely to facilitate the selfish accumulation of wealth.

Labor Organizations

Approximately 200,000 factory workers are now organized into various labor unions in different cities. Up to the present they have been the most successful of all workers in efforts to secure higher wages and better working conditions. Their organizations are the most efficiently conducted among all the labor organizations now in operation in China. Next to them, in numerical strength, are the miners and railway men, who number about 185,000. In most of the trades the craft guilds are active and the influence of the labor union is not strong. The agricultural workers, who are more conservative than the craftsman, are at the present time the least organized. No accurate estimate of the number of the last two classes of workers is now available.

Of the more successful labor unions, the Returned Laborers' Union, composed of the returned laborers from France, merits particular attention. Besides attempting to improve conditions of employment, the union has a program of wide scope. While in France, thousands of the workers abstained from drinking and gambling in order to send their humble savings to support elementary schools in their home villages, and now the organization feels the wisdom of encouraging temperance and other character reforms among the workers on a large scale. Furthermore, the union isolates itself from politics in order to insure a free and unhampered development along purely industrial lines. With these broad objectives in view, the union makes the following declarations :—

Aims.—The principal aims of the union shall be to co-operate with the workers to strengthen collective bargaining, to increase common knowledge through frequent association, and to promote a cordial but non-partisan friendship.

Resolutions.—The members are resolved not to drink alcohol, or to visit prostitutes, or to gamble, or to smoke opium or use its derivatives.

Claims.—The union claims the right to strike for improved working conditions, and the right to hold meetings or to make public speeches for promoting public welfare of the workers.

The union elects a chairman, a secretary, a treasurer, and ten councilors to take charge of various activities of the organization.

Yellow River Bridge

WE have already informed our readers that the competitive design and tender for this work was awarded to a Belgian combination made up of the Societe d'Etudes et de Construction, the Societe Belge de Chemin de fer en Chine, and the Compagnie Generale de Chemin de fer et de Tramways en Chine. Of these companies the two latter are well known in China; for purposes of the bridge the first-mentioned is the active member, and the work of preparing the design and estimates was in its hands.

The Societe d'Etudes et de Construction was formerly known as the Societe Anglo-Belge de Construction and is a subsidiary combination between Messrs. S. Pearson & Son (Contracting Department) Limited, of London, the well-known contractors for public works and the Compagnie Belge de Chemins de fer et d'Entreprises of Brussels (formerly Compagnie Generale de Chemin de fer Secondaires) a well-known firm in railway engineering.

Two designs and tenders were prepared in mutual consultation, one by each of the above firms; that of the larger spans by the Compagnie Secondaires known as "A" design, and a more economic design with more moderate spans known as "B" design by Messrs. Pearsons. It is to the latter design that the first place has been awarded.

The consulting engineers for the projects sent in by the combination were Sir Ernest Moir, Bart., of Forth Bridge renown, M. Clavier, Grand Cordon de l'Order de Double Dragon de Chine, who built the existing bridge over the Yellow River, and Mr. T. J. Bourne, C.B.E., who for over 30 years has been associated with Chinese railways, who built the Huai bridge at Peng Pu, and was in charge of the designs for Messrs. Pearson. The firm of Pearsons is known to the Chinese as the Ta Cheng Kung Ssu. It will be of interest to our English readers to know that British interests are associated with this new and important work.

Engineers' Club (London)

WHILST the writer was in England last year a project was on foot for forming an engineers' club in London. The scheme met with immediate support and it was decided that membership should be made as wide as possible and include those engaged in the design, superintendence, direction or control (technical or commercial) of engineering and its allied industries, such as metallurgy, chemistry, architecture, etc.

The following subscriptions were proposed:—Town members: £10.10.0. per annum; country members, £5.5.0. per annum; overseas foreign members, £2.2.0. per annum

Some difficulties have been met with, but the club was officially opened on September 1st, 1921, at the premises of the Road Club, 39 Coventry Street, near Picadilly Circus, which have been taken temporarily for the purpose. The membership already exceeds 2,000 including a number of overseas men.

A commencement in this manner was considered advisable because the present is not an opportune moment for a scheme involving heavy financial outlay and even were it possible to start building suitable premises two years or so would probably elapse before the club could be got going.

The final premises decided on will have bedroom, lunching and dining accommodation as well as smoking room, billiard room, writing room, card rooms, etc. Ample sleeping arrangements are a cardinal feature of the scheme, and provision for the welfare of overseas members will be a foremost item in the organization.

The writer felt that the foregoing facts should be brought to the notice of interested parties in China and he has been provided with official forms and authority to take the present action. Membership application forms can be had from: Mr. H. J. SMITH, M.I. MECH. E., c/o General Electric Co. (of China), Ltd.

The Statistical Aspect of British Railway Operation Methods

(Contributed)

THAT comparisons are odious is unquestionable, but that they are instructive is some times overlooked especially by a conservative race. In any case the contrast of vital railway operation statistics on which labor conditions have little or no bearing gives much food for astonished thought when the railways of the United Kingdom are considered vis à vis other countries.

Take the case of that most vital of all railway operation figures average tons per train. The following table is illuminating :—

	Average Tons per train	
United Kingdom (March 1921	.. 123.52 tons	Cape Gov'nt Rlys.
United Kingdom (July 1920	.. 135.35 tons	
United States	.. 445	1916 142 tons
India	.. 189	
Japan (1918	.. 142.6	128 (1916)
Germany	.. 240	
Chinese Government Rlys (1919)	.. 270	257 (1918)

The arresting fact here is that the British railways in this respect are to be classed below Japan, a narrow gauge country. An examination of the factors controlling tons per train merely confirms the suspicion that railway operation in Great Britain leaves somewhat to seek.

Tons per train is controlled largely by gauge limiting gradients, rail weight, rolling stock equipment, empty wagon mileage and full loads when trains are run.

With regard to gauge railways of the United States, United Kingdom, China and Germany are standard 4-ft. 8½ and 2-ft. with negligible exceptions. India has four gauges 5-ft. 6-in., metre and 2-ft. 6-in. the various approximate mileage under each on the 1919 report being 16, 742, 13, 226, 2650, 638 while Japan and South Africa have a 3-ft. 6-in. gauge with a considerable mileage of 2-ft. 6-in. gauge the mileage of 3-ft. 6-in. gauge in Japan being 6,125 and that of the narrow gauge 1,465. The effect of gauge on train load for gauges of a metre and upwards is slight for, given the rail and weight, locomotives can be designed to handle loads up to the full capacity of the rail, but for gauges below this conditions of stability and the necessity of limiting piston speed have a decisive effect on design which increase rail weight cannot counteract. The most vital effect of narrow gauge is its effect on line capacity owing to lower speeds.

From the previous paragraph it will be observed that the British railways suffer no real handicap from the gauge question, and the same conditions obtain with regard to limiting gradient the ex-European Railways in the list operating considerably heavier grades on their first-class lines. Thus in China limiting grades for easy country are 1 in 150 while in mountain districts 1 in 30 is allowed, two such railways being included in the report for China from which the figure of 270 tons per train is obtained. Again Japan is hampered by a limiting gradient of 1 in 40 on important lines and also has to operate at least two rack sections. while the Indian Railways are handicapped by limiting gradients of 1 in 80 for the 5-ft. 6-in. gauge line, 50 for the metre and 1 in 30 for the 2-ft. 6-in. Practically similar conditions are met with in South Africa where grades exceeding 1 in 40 are operated and 1 in 40 is the ruling grade throughout the country.

In the matter of rail weight the most vital factor after gradients in its effect on train load the home railways occupy an exceptional position, the 90 to 100-lbs. rail being general and the 80-lbs. rail rather exceptional for first-class lines. The railways contrasted have the following rail weights :—

United States 80 to 100-lbs.—85-lbs. being general.

India 79 to 100 on the 5-ft. 6-in. gauge, 50 and 41 on the metre gauge, 30-lbs. on the 2-ft. 6-in.

Japan 60 to 75 on the 3-ft. 6-in. gauge.

Germany about 85-lbs.—18-ton axle loads.

China 85-lbs.

South Africa 80 to 60 the mileage under 80-lbs. rail being comparatively small while a 35-lbs. rail is standard on the 2-ft. gauge lines.

The effect of rail weight on train load is, of course, to cut down the allowable axle loads on locomotive drivers thus limiting adhesion and haulage capacity. While it is recognized that there are other vital factors effecting average train load such as empty wagon mileage, gradients, etc., the following table for three Indian gauges is unquestionable illustrative of this effect :—

Railway	Rail Weight	Train load
	5-ft. 6-in. gauge	
Bengal Nagpur	90	298
B. B. & C. I.	69	310
East Indian	85	317
G. I. P. Railway	100	215.5
	Metre Gauge	
Assam Bangal	50	109
Bengal A. Western	50	113
B. B. C. I.	41½	137.3
Burma	50	138.9
	2-ft. 6-in. Gauge	
Nagpur Chindwara	30	78.3
Kalka Simla	30	22.3
Trans Indus	30	25.2

The above figures are for the first half of the year 1917-18. This table also sufficiently indicates the effect of gauge and rail weight on reducing the average train load for a country such as India with a considerable mileage of mixed gauges. Yet India as a whole shows a better average by over 60 tons than the British railways equipped to more or less uniform and infinitely superior standards. In the case of the United States, Germany and China countries where equipment is more or less to home standards it will be observed that average tons per train is enormously in excess of that obtained in the United Kingdom. In the case of China this average is much reduced by inclusion of a metre gauge line operating traffic over a line equipped with a 56-lbs. rail and having a limiting grade of 1 in 48. Yet the average of this line in 1918 was 105 tons per train.

The mileage of 2-ft. 6-in. gauge in Japan and 2-ft. 0-in. gauge in South Africa would also, of course, have a lowering effect on average train load.

The effects on train load of rolling stock equipment empty wagon mileage, are so closely related that they will be dealt with as a whole.

Thus in the first place it is obvious that necessary equipment is limited by line capacity in the first place, that is number of tracks and if single tracks frequency of crossing places. Line capacity again is further limited by average speeds. In this respect the British railways occupy a vastly superior position as practically all important lines have four tracks in congested districts with separate tracks for fast and slow goods, while single track mileage is almost negligible instead of being usual in the case of all the ex-European railways considered. The British railways should, therefore, be in a position to cope with a vast traffic with rolling stock of a total car capacity (for tonnage offering), giving far less margin than the other railways considered, for line capacity aside England must be a country of conspicuously short hauls. Average speeds must be considerably higher than lines in the majority of cases single tracked.

Further in the question of empty wagon mileage the British railways should be in a superior position to the railways considered for they are not faced with the problem of dealing with traffic which at certain seasons of the year sets in a fixed direction entailing long return hauls of empty stock. As there is no return tonnage the consequent reduction in average train load is enormous for these return train miles are totally unproductive, whereas the

March a bad month. July 1920 figure is a better indication.

direct opposite must hold in Great Britain with its vast import and export trade. There should in England be always a high proportion of return tonnage and average train-load should show this which it certainly does not. The percentage freight upon capacity hauled in the United Kingdom should be considerably superior to any of the railways under consideration. The train-load figure indicates no such superiority.

Shortage of rolling stock might be alleged as an excuse for poor train load as in this case cars when unloaded must be hauled away at once wherever the demand is most immediate instead, of waiting for a load in the immediate neighborhood. This, of course, is conducive of excessive empty wagon mileage with consequent reduction in train load. With plenty of return tonnage as must be the case no such excuse can be advanced.

Further with conditions as above number of loads per car per year or annual tons per ton of car capacity should be exceptionally high on the British railways if cars are unloaded with promptitude and demmurrage rates made sufficiently exorbitant. So far as is known no figures for either percentage freight upon capacity hauled or number of loads per car per year are available for the British railways. On the Chinese railways, which are lamentably short of rolling stock and where the average haul for the system is 184 kilometres—115 miles (the least being 67 kilometres and the maximum 310 kilometres)—the number of loads per annum per car reaches the high figure of 75 the maximum being 204 for a short mineral line—45 miles average haul—and the minimum 31 for a line run at a loss. The time allowed for unloading on the Chinese railways is 12 hours.

In connection wih rolling stock equipment it is of considerable interest to contrast the equipment for dealing with traffic of varying density.

Country	Goods Traffic Tons per mile	Trains per day *	Engines per mile	Wagons per mile	Average haul
United Kingdom 1912	22,300	50.4	1	33.5	55.87† Mch. 1921
United States 1911	7,420	14.2	0.25	8.8	149 miles
Bengal Nagpur 1918	3,575	24.9	0.27	8.06	305 miles
Bombay Baroda 1918	2,400	23.	0.29	7.1	356 miles
East Indian 1918	9,300	41.7	0.51	12.4	385 miles
The above 3 Indian lines are 5-ft. 6-in. gauge.					
S. Africa 1916 ..	1,460	10	0.17	3.13	184 miles
China 1918 ..	5,320	12	0.037	2	115 miles
Japan 1918 ..	9,370	27.2	0.543	8.8	103 miles

Country	Total Wagon capacity Tons	Number of loads per car per year	Per cent. freight on capacity hauled	Average capacity per vehicle tons.
Bengal Nagpur ..	233,000	30	50%	16.5
Bombay Baroda ..	176,000	19.8	44%	18.7
East Indian	592,000	25.2	44.7%	17.0
S. Africa	547,185	24.6		20.6
Japan	467,021	107.5	51%	10
China	246,849	75 estimated	36.5%	24

Number of loads per car per year is, of course, obtained by dividing wagon capacity by total tons carried per year and if on the rather extravagant assumption that the average car capacity of goods vehicles in the United Kingdom is 10 tons it will be found that annual number of loads on the English railways is about 68 a very poor figure considering the enormous tonnage § available, the short haul and very high line capacity of the English railways. The figure means that the average time for each car to load, unload and travel is 5.35 days a figure indubitably capable of reduction for as volume of traffic increases so should number of loads per car per year and the tonnage per mile offering on the United Kingdom railways is enormously the greatest in the world. The number of loads per car per year should be at least twice what is surmised when the exceptionally favorable conditions are considered.

While it is recognized that it is impossible to dogmatise without an exact knowledge of local conditions the above freight stock statistics indicate that the Japanese railways are very efficiently run but that a higher capacity wagon as on te South African railways might be introduced with considerable economy a reform which must be introduced sooner or later on the British railways.

The following table indicates the percentage dead weight to capacity for various classes of British-built goods coal wagons. Comment is superfluous :—

Capacity of wagon	Tare of wagon	Per cent. Dead Weight to capacity
8 Tons	5.5 Tons	68%
10	5.8	58%
20	8.2	41%
25	10.17	40%
32	13.10	41% Hopper wagon all steel
40	16.7	41.6% " "

Further the low percentage freight on capacity hauled for China's railways is an indication of higher empty wagon mileage as the result of inadequate rolling stock while the small number of loads per year on the Indian railways appear to indicate over equipment in spite of the very long hauls.

The question of what is adequate or inadequate in the matter of rolling stock is a particularly thorny one but it would appear that it should be considered from the following point of view. Thus take the case of a line equipped with 60-pound rail, single track with crossing stations at 5-mile intervals and with a limiting grade of 1 in 120. Goods trains on such a line would not exceed a car capacity of 400 tons and if we assume that freight is 50 per cent. of capacity hauled tons of freight per train should be 200. Then if the average haul is 100 mile each 100 miles of line should be equipped with a car capacity of 400 multiplied by the number of necessary trains obtained by dividing the daily tonnage available by 200 tons. This number of trains is, of course, limited by line capacity which is, say, 32 goods trains out of a daily total of 36—four being passenger trains—for a single line as above. Thus the maximum daily capacity of a single line as above is about 6,000 tons per 100 miles and for this 12,000 tons of car capacity is required of Number 4/30 tons cars per mile. Passenger stock can be treated on the same basis with an assumed relation between seat mileage hauled and seats occupied generally about 25 per cent. The above, of course, assumes a daily motion of 100 miles per car and neglects stock not in motion. This might be true for passenger stock only on double-track lines but for goods stock is incorrect for single-track lines at least and probably double track. Thus in the U.S.A. daily movement per wagon is 28.1 miles with a 30-ton load while in Japan it is 58 miles and in England about 15 miles and 1 ton. Figures for goods stock should thus be increased.

Without many essential statistics either not available or not recorded criticism or even intelligent interest in the operation of the British railways is an impossibility. All that can be surmised from the very favorable conditions under which British railways are placed in the matter of gauge, rail weight, line capacity, short haul, etc., is that trains are either not loaded to capacity, or that empty rolling stock is not used ‡ or, unnecessarily moved, or again that there is excessive delay in loading or unloading stock. If the need for rapid transit of goods is conducive of running trains which are neither loaded to full capacity of stock hauled nor to the haulage capacity of the locomotive then those interested on railway

* This figure obtained by dividing daily train miles into mileage is for all classes of trains. Goods trains per day on the three Indian lines are 10.3, and 17 while in China and Japan the figures are 6 and 9.

† Coal, coke and minerals the bulk of tonnage 46 miles only. Train miles per train hour 8.86. Train miles per engine hour 3.36 for freight traffic.

§ Freight ton miles month of March 1921 1,209, 571, 140.

‡ This is a probable corollary of private wagon ownership.

transport should be called upon to bear one more hardship that of running business on larger stock, but it is not believed that this can be the cause of much uneconomical running for the bulk of the tonnage carried must be minerals or manufactured goods for which rapid transit is not urgent. For such commodities there can be excuse for running under-weight trains.

The question of rapid loading and discharge for mineral traffic can be dealt with by the introduction of the high capacity hopper wagon with high level facilities for bin discharge, while for small consignments the introduction of fast electric traveling cranes of the gantry* type spanning several sidings should surely be feasible. Further it would appear to be advisable to throw the onus of collection and delivery perhaps even discharge and loading of cars on transport companies or even consigners or consignee.

Other obvious reforms applicable to all new work and renewals are as follows :

The substitution of the flat-footed for the bull-head rails. With the 90-lb. 30-foot rail with 12 sleepers under this would effect an economy in chairs of 90 tons of cast iron per mile valued at least £1,300 at the present price of pig iron.

The introduction of the high capacity wagon for reasons previously detailed and for the economy effected in shunting and marshalling, etc. The introduction of the Janney or other automatic coupler which would eliminate much of the risk† incurred by shunters and facilitate more rapid movement of cars. Further this reform would render the feasible introduction of the continuous brake for all stock, another change making for increased speed of operation.

As regard personnel the following table provides a contrast :—

Country	Year	Employees per mile	Employees per 100,000 train miles	Train Per day
United Kingdom	1912	Total 26 P.W. Dept. 2.83	147	48.5
Canada ..	.. 1915	„ 3.37	199	
United States ..	1916	„ 6.25 P.W. Dept. 1	128	14.2
France ..	.. 1912	„ 13.9	139	
India ..	.. 1915	„ 17	382	
Japan ..	.. 1918	„ 20.8 P.W.D. 2 to 3	213	27.2
China ..	.. 1918	„ 18.5 P.W. Dept. 6.1	435	12

These figures seem to indicate that there is room for economy if we contrast the figures for the United States and ourselves making allowance for the greater traffic density. The superiority of the United States is without doubt due to the use of machinery to a greater extent than is customary with us a remark perhaps still applicable to most of out industries. This consideration apart it would be appear that considerable reduction could be made in the permanent way department.‡

With regard to locomotive performance the following statistics indicate no bad performance for the home lines :—

United Kingdom	1914	25,300 miles per locomotive per ann.
United States ..	1914	27,300 „
Japan ..	.. 1915	26,600 „
China ..	.. 1918	29,700 1919 29,783 „

Other minor reforms which would effect considerable economy are the institution of the Pullman car system giving much greater seating capacity per passenger car. Another necessary innovation should be modern coaling plants on the hopper system for fuelling engines. Something should be done to stimulate interest in the study of railway economics, a branch of railway science totally neglected in British educational institutions as is also the study of railway location, which receives equally scant attention while being perhaps the most vital importance. There can be no greater mistake than the supposition that an efficient surveyor is qualified to locate a railway.

Nationalisation has been definitely decided against for the grouping system but for those opponents of the principle the following facts are presented in refutation of the fact that absence of competition is conducive of inefficiency and stagnation.

The Japanese railways were nationalised in 1906 when the total mileage was 4371 miles. The mileage at the present is just under 6,000 miles while enormous betterments have been carried on in the interval. Passenger traffic has more than doubled itself and the cost of transport has fallen, while goods traffic is more than four times its original volume with a considerable fall in rates as well. Rates have fallen as follows :

	Year 1906		Year 1916
Passenger fares ..	Y.0.0155	per mile	Y.0.0134
Goods rates ..	Y.0.0199	per ton mile	Y.0.0166

In other respects the following statistics indicate at least that government control has done no harm.

Year 1906 Average total load per goods wagon ..	..	7.1 tons	
Year 1916 „	..	9.9 „	
Year 1918 „	..	11.6 „	
Year 1906 Average load per train	71	tons Number of cars	20
Year 1916 „	128	tons Number of cars	28
Year 1918 „	142	„	28

The above figures speak for themselves.

Again the government railways of China have been uniformly and increasingly prosperous in spite of the fact that the system of foreign loan agreement under which the system has been constructed tends towards uneconomic de-centralisation and plurality of officials. There are, for instance, in a system totaling 3,465 miles 14 separate administrations ascribed mainly to this cause yet the return on capital invested was 10.9 per cent. for the year 1918. The Peking-Mukden Railway the nucleus of the system has paid dividends of the order of 20 per cent. since 1905.

The system of nationalisation has also been applied to the railways of South Africa. They are at any rate solvent and pay dividends which have risen from just over 3 per cent. in 1914—a slump year—to just under 5 per cent. (£4.13.0 to be exact)—in 1916.

Unquestionably nationalisation would eliminate much competitive and wasteful construction, it would do away with traffic canvassing, and reduce enormously the cost of advertisement while considerable economics could indubitable be effected in personnel. Thus there is very little question that the numerous privately owned stations serving each of the great cities of the country are an extravagance as much now as when built for they occupy much wanted land and must be very costly in the matter of interchange traffic. There is little question that they would never have been allowed under a centralised control. As regards personnel the consolidation of 132 companies cannot fail to effect economies of which the elimination of directorates drawing £200,000 a year must be considered by no means the most important.

The great benefit of nationalisation would be the introduction of co-operative working between the railways and the common use of rolling stock. The system of private wagon ownership must be eliminated for efficiency of working and economy of national capital. Further there is unquestioned need of centralised control of routes to be followed and ports of destination to ensure economic distribution of work for the railways and the avoidance of unnecessary congestion.

While it is recognized that reform is a slow and painful process the large deficit for the year 1920 is a sufficient indication of its urgency. Under the stimulus of a great war Great Britain is said to have revolutionised her industries and she would do well to immediately follow the American example of 1866 and apply the same process to the railways. Without railway efficiency British industries cannot be thoroughly modernised; cheap and abundant fuel and efficient transport are the life blood of a country.

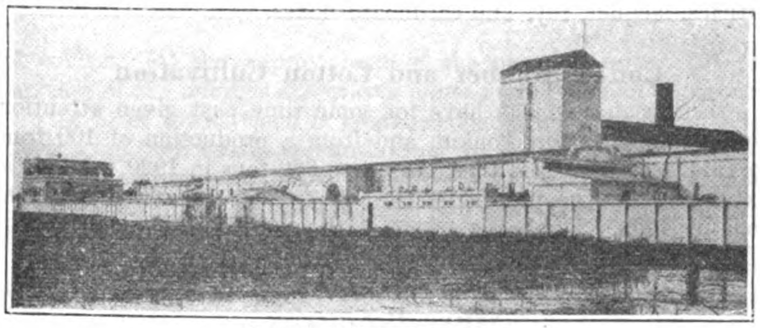
* This would only be applicable to loading open cars.

† In 1910 1 in 553 shunters employed were killed and 1 in 10 injured. The total shunters employed was 13,381.

‡ British track is incomparably the best in the world. It is over excellent and uneconomic.

Industrial Progress in Indo-China

INDO-CHINA is held to be France's richest colony. Throughout the country are grown rice, sugar and cotton; the south produces, in addition, pepper, copra and rubber; and the north, tea, coffee and maize. There are large teak forests in Laos, pine forests in Cambodia, and various species of building woods are found in Annam. These forests supply a number of by-products, such as gums, resins, varnishes, etc.



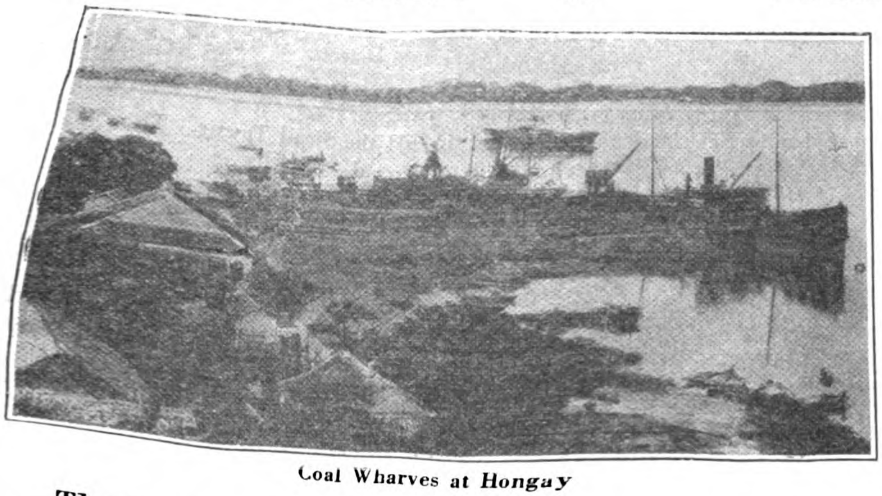
Cotton Mill at Haiphong

The country, and especially Tonkin, is rich in minerals; coal, iron, zinc, lead, tin, gold, wolfram, copper and silver being found there; in Annam there are coal, iron, gold, antimony and graphite; and in Laos, copper, silver, gold, tin, lignite and iron.

The population is dense only in the deltaic plains and round the river mouths, and is very sparse in the hilly forest clad regions of the north. The entire population of Indo-China is estimated at from 16 to 20 millions, though the country is rich enough to support 100 millions. An example of the manner in which the country has advanced in one generation under colonization may be found in Haiphong, the chief port of Tonkin. This town did not exist in 1880, and has to-day 75,000 inhabitants, twenty-six factories and a harbor which is held to be among the best equipped in the Far East.

Transport Routes

There are over 2,500 miles of navigable streams and canals in Cochin-China and Cambodia in the south; while Tonkin in the north has 700 miles.



Coal Wharves at Hongay

The system of railways comprises a total of 1,200 miles of line, of which nearly one-quarter is in Chinese territory. It is, however, insufficient, and further lines are urgently called for, notably the completion of the coast railway and its necessary branch lines; the line from Saigon to Pnom-Penh and Bangkok, 500 miles; and the line from Hanoi to Bangkok, of which some 350 miles remain to be completed.

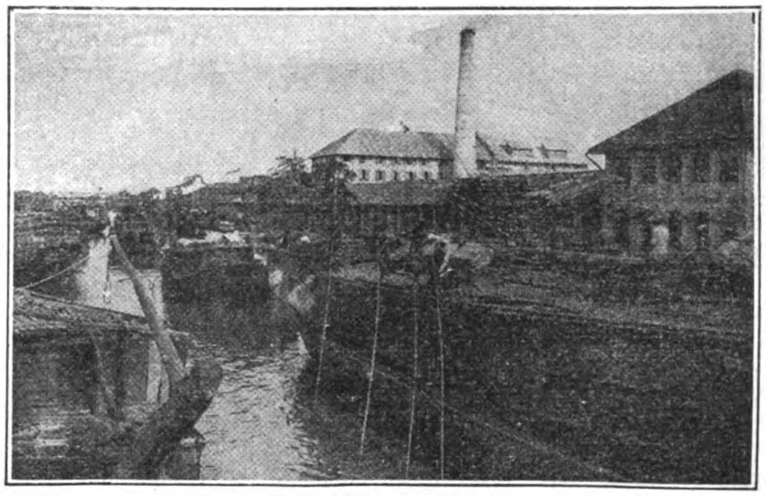
An interial loan of six million piastres is to be raised for the purpose of completing the construction of the coast railway between Vinh and Dong-ha, near Hué, in Annam. There will then only remain the Tourane-Nhatrang section to be completed to connect Saigon with Hanoi and Yunnan.

There are over 9,000 miles of motor roads in the colony, and the number of public motor services is increasing rapidly. The larger towns possess electric power stations. Saigon and Hanoi are both equipped with a system of electric trams, and the former has also a steam tramway.

Mining Industries

The principal coal mines are found at Hongay, in Tonkin, with an annual output of 750,000 tons. There are factories making coal briquettes at Dongtrieu with an output of 100,000 tons; at Tourane of 60,000 tons; and at Kébao of 40,000 tons per annum.

Zinc is produced at Chodien (14,000 tons per annum); at Tuyen-Quang (12,000 tons); Langhit (8,000 tons); and Pakvan

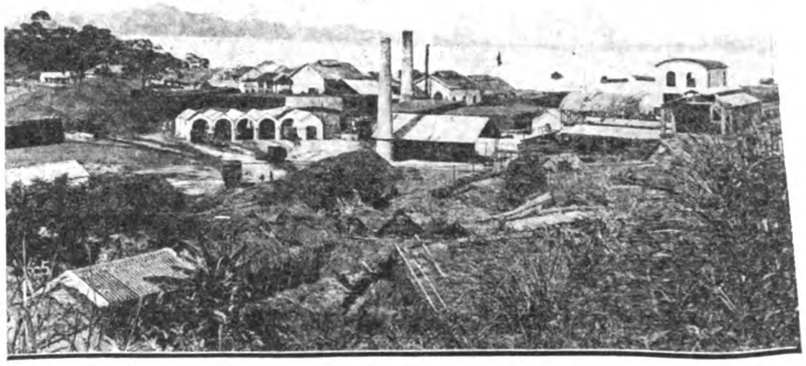


Rice Mill at Saigon

(6,000 tons per annum). The mines at Chodien and Laughit are particularly well equipped in plant and machinery.

Tin and wolfram are produced at Pia-Ouac, the mines being worked by the most modern machinery.

Graphite is produced at Lackay and Quang-Ngai; gold at Bong-Mieu; iron at Thai-Nguyen and Thanh-Hoa; lead at Tuyen-Quang; phosphates in Tonkin and Cambodia.



Briquette Plant at Hongay

Other Industries

At Haiphong, in Tonkin, is a cement factory; there are also five rice mills, five machinery workshops, two tile factories, a soap factory, a perfume factory, an iron foundry, a cotton spinning mill, a glass factory, a brick and tile works, an aerated water factory, a porcelain factory and a coal briquette factory.

An Indo-China Automobile Route, at the entrance to Baria

Hanoi possesses a distillery and brewery, railway workshops, a match factory, two pottery factories, a tannery, a tobacco factory, a steam saw mill, a printing works, and porcelain, ice and aerated water factories. At Nam-Dinh there are a distillery and a rice mill, tile and brick works, a saw mill and engineering works and silk and cotton weaving mills.

At Vinh-Benthuy, in Annam, there are saw mills and a furniture factory, and the match industry is also established. Cement and pottery making are carried on at Hué and meat canning at Benthuy.

At Saigon and Cholon, in Cochin-China, there are fifteen large rice mills, two distilleries, an arsenal, four engineering yards, railway repair shops, saw mills, pottery works, oil works, match factories, breweries and mineral water factories, boat builders and paper makers.

Modern Water Works are Supplanting the Old Wells. The Water Tower at Baria, in Cochin-China

Saw milling, the manufacture of furniture, rice milling and silk weaving are industries of Pnom-Penh, in Cambodia.

The cement works at Haiphong produce 150,000 tons yearly, and will soon be able to increase this by 50,000 tons. Three thousand workmen are employed. The canning factory at Benthuy, in Annam, can handle 100 cattle or 500 pigs daily. The oil mills of Saigon can treat 6,000 tons of copra yearly, while the rice mills turn out 500 tons daily.

Native industries flourish, principally among the Tonkinese, whose embroidery and mother-of-pearl work are well known in the Far East. Among articles of utility, the Tonkinese manufacture leather goods, trunks and boxes, cane baskets and similar articles, lacquer, toys and cardboard boxes.

Coffee, Rubber and Cotton Cultivation

European colonists have for some time past given attention to coffee-planting in Tonkin, and from a production of 100 tons in 1914 have increased their output to 800 tons in 1920, while it is expected that the production will be further expanded to 2,000 tons by 1923. Rubber is grown in the south and the cultivation of cotton on a large scale is being undertaken.

Native Prosperity

The purchasing power of the native inhabitant has increased enormously since 1914, particularly in the south, as much because he has made money and become accustomed to comfort and even luxury, as because his capacity for work and his initiative have greatly increased. There is a widespread desire for progress with a corresponding demand for equipment. In the north, however, especially in Tonkin, there is less money, and consequently a

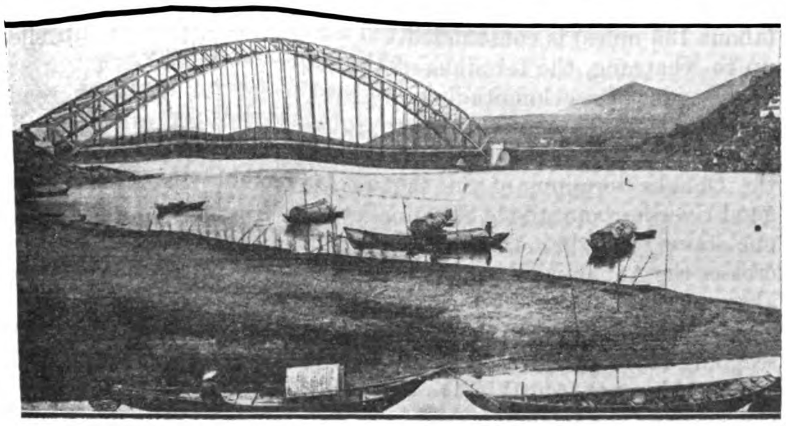
Splendid New Markets are found in all the Small Towns. The Market at Kiadaurnot

smaller demand for luxuries. There the inhabitants are anxious to provide themselves with irrigation installations, and water filtering apparatus, etc.

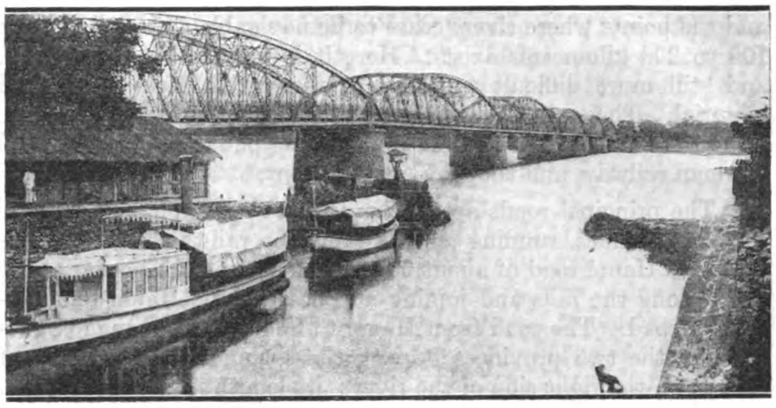
The spirit of initiative in Indo-China has greatly developed in recent years, and all recent enterprises, whether industrial or agricultural, have been characterized by breadth of conception.

Most Pressing Needs of the Country

It is of the greatest importance that the economic equipment of the colony should be completed by (1) the construction of rail and tramway systems and the development of commercial automobilism; (2) the construction of a mercantile fleet for the maintenance of commercial relations with China, Siam, the Philippines and the Netherlands East Indies; (3) the construction of a fleet



Railway Bridge at Ham-Rong, Annam



The Shan Shai Bridge at Hue, Annam

of colliers; (4) the improvement of the postal service; (5) the increase of the number of working mines and of mining apparatus.

In most towns there is great need of plant and material for electric lighting, ventilation and power, for an extension of existing railways, and the creation of new lines, especially in Cochin-China, where motive power is for the most part gas, drawn from the distillation of wood or waste.

There is an equally urgent need of material for the laying of water supply. The tendency in the more prosperous towns is to erect small installations for the purification of water.

In the agricultural districts, large schemes are in operation for draining the marshes and for irrigating the rice fields, especially in Northern Annam. Central electric power stations will be erected under these schemes at Hanoi (2,000 h.p.) and Thanh-Hoa (1,200 h.p.) for pumping where irrigation by gravitation is not possible, and the current will be distributed along the various canals and streams.

Banks

There are at present seven banks in Indo-China, as follows:

Banque de l'Indochine (French) at Saigon, Pnom-Penh, Tourane, Hanoi, Haiphong;

Banque Industrielle de Chine (French), at Saigon, Hanoi, Haiphong;

Chartered Bank of India, Australia, and China (British) at Saigon and Haiphong;

Hongkong and Shanghai Banking Corporation (British) at Saigon and Hanoi;

Yokohama Specie Bank (Japanese) at Saigon;

China and Southern Bank and the Banque Chinoise (both Chinese) at Saigon.

The Native Trade

In addition to the materials, machinery, etc., required in the conduct of the various industries and services dealt with above there are in demand among the natives cotton and black silks, stockings and socks of worsted and wool, boots and shoes (especially men's), clocks and watches, wristlet watches, alarm clocks, gramophones, umbrellas and sunshades, condensed milk (sweetened), chocolates, sweets and biscuits, etc.

New Road and Bridge at the Entrance to the Village of Cua Nhap

Trade in 1919

In 1919, the latest year for which figures are available, the commerce of French Indo-China was valued at 2.293 million francs, or 1,181 million francs more than in 1918, and 1,332 million francs above the average of the five preceding years.

In 1919 France and French colonies accounted for 15 per cent. of the entire commerce of Indo-China, as compared with 29 per cent. in 1910, foreign countries making considerable headway in the interim.

Roads in Indo-China

THE system of roads in Tonkin is in its infancy. In the early days of the French occupation of the country—and it must be remembered, when judging Tonkinese matters, that such occupation dates back only 33 years, and that the country was not really pacified until 15 years ago—the roads were naturally much neglected. In the low-lying part of the territory it was extremely difficult to build roads on account of the marshy nature of the ground, and also on account of the many large rivers and canals to be crossed, these being themselves used as means of communication. In the highlands, roads, although necessary from the military point of view, were not made, as mule paths were sufficient. Those paths, very seldom practicable for carriages, still exist throughout the whole country. The creation of a complete system of roads was only seriously commenced a few years ago. This meant a very large amount of work. In the delta the country lies very low, and is subject to inundation; therefore considerable earthworks are necessary for the establishment of roads. Besides, stone for ballast is not abundant; it has to be brought a great distance, so that the work, in spite of the cheapness of labor, is very expensive. Then the dykes, which were constructed several centuries ago, and must be continually raised to prevent floods, absorb a large part of the money available yearly for public works. It is therefore not astonishing that the building of roads in the delta should proceed slowly. In the highlands it is still slower, as numerous bridges, tunnels, cuttings, etc., are necessary, and labor is nearly everywhere lacking. Thus there are few roads in Tonkin and North Annam. They are not even sufficient to allow a complete tour of the country, and they would be insufficient for economic needs but for the great number of waterways which, in most cases, make up for the scarcity of roads. Then, too, many mines in the highlands lack sufficient means of transport. A very large development of the mining industry is expected when the chief mines are enabled to evacuate easily their ore. For most of them at present this is impossible, as between the mining districts

and the points where rivers cease to be navigable a stretch of from 100 to 200 kilometres exists. Here it is very difficult to travel, and still more difficult to carry at reasonable rates goods and material. The only lines entering the district are the Hanoi to Langson and Nacham railway and the Haiphong to Laokay and Yunnan railway, and they are not sufficient.

The principal roads are in the delta—the Haiphong to Hanoi road of 63 miles, running mostly along the railway, and the Haiphong to Hanoi road of about 60 miles, following the border of the delta along the hills and joining at Bac-ninh the Hanoi-Phulangthuong road. The road from Hanoi to Sontay and Hunghoa goes through the two provinces bearing those names, to the north of Hanoi, on the right side of the river; its length is about 50 miles. The road from Haiphong to Nandinh and Ninhbinh traverses the whole delta, cutting across a number of large rivers, some of them over half a mile wide, and passing through the rich agricultural districts of Kien An, Haiduong, and Thaibing. It has a total length of 60 miles. The road from Nandinh to the sea runs 45 miles through rich agricultural plains and the salt district.

On the coasts of Tonkin and North Annam, the so-called, Routu Mandarin, which existed under he Annamese Government, and joined Saigon and Cochin-China to Hanoi and Tonkin through the whole length of Annam and through Hue, the capital of Annam, but which was not fit for carriage traffic, is being reconstructed on modern lines. The road is in good order where it is finished, and it is excellent for motor-car. Traffic is already substantial on the completed portion—that is to say, over 500 miles from Hanoi to Hué and Tourane and more to the south. When finished it will have, with the road to Caobang in Tonkin and the existing roads south of Saigon, a total length of about 1,500 miles.

In the highlands there is the road from Hanoi to Bac-ninh and Phulangthuong and Kep; it is partly on the plain, and goes as far as Langson on the Chinese frontier. That direction is now served instead by a railway. From Phulangthuong the road continues to the northeast towards Luc Nam and An Chau in a mountainous district, rich in mines and a good hunting ground; its length is about 100 miles. The road from Hanoi to Thai Nguyen and Backan, in very picturesque country, ends in a rich mining district, and is being pushed on as far as Caobang, the centre of the tin and wolfram mining district. A motor-car service joins Hanoi to Caobang; the total length being 111 miles. The road from Phutho on the Laokay railway to Tuyen Quang, with a regular motor-car service, has a total length of about 40 miles. The present terminus, Tuyen Quang, is an important mining centre. The road is to be extended farther north along the River Claire up to Hagiang; at present it is only serviceable for riders.

There are no other important roads, but the construction of highways has been rapid for the last three or four years, even during the great war, which has reduced the European staff. When normal times again prevail, it is probable that the mining districts and all important centres will be provided with proper means of communication.

Annam Roads

On account of the shape of the country, communications are mostly by sea. The ancient Annamese dug a very winding, and now more or less silted up, but still useful, canal for intercommunication by land in the three northern provinces, besides which, between Hué and Donghoi, communications were facilitated by a series of lagoons. The Mandarin Road, which ran along the whole of the coast from Saigon to Hanoi, was but a path. The trans-Indo-China railway and the new Mandarin Road will, however, establish uninterrupted communication between all the towns bordering that long ribbon of coast-line. The railway is in three sections. The southern section, from Saigon with its terminus at Nhatrang, is 280 miles long. The central section, from the port of Tourane to Hué and Donghoi, is 110 miles long. The northern section, from Nacham to Hanoi and Vinh Benthuy to Baiduc, has a length of 375 miles. The railway from Baiduc to Donghoi (about 135 miles) is constructed. The Mandarin Road is finished up to Nhatrang, the terminus of the southern railway.

Besides those longitudinal highways, three important roads have been under construction to join the Mékong and tap the highlands of Laos. The most important is 200 miles long, between the Dongha terminus of the central railway and Keng Kebao, a good river harbour above Savannaket on the Mékong. The second one starts from the northern railway line, 15 miles south of Vinh, crosses the Annamite Range near Nape in Laos, to join the Mékong above Pak Hinboon on the best navigable stretch of the river. That route is only 115 miles long, and has the advantage that seagoing launches are able to go right to its eastern terminus. A third road starts from Vinh to climb to the highlands of Laos and the Tranninh tablelands.

Mines in Indo-China

THE unfavorable economic conditions prevailing throughout 1919 seriously affected prospecting activities during the year, the number of new mining claims being only 189 with 39 renewals of permits. The special facilities conceded for the renewal of permits during the war were revoked on July 1st, 1919. The number of licenses now in force throughout the colony are distributed as follows: Tonkin, 451; Annam, 140; Laos, 24; Cambodia, 74; Cochin-Chine, 17. These figures do not include licenses automatically suspended by reason of the mobilization of their holders and of which no record has been filed with the mining bureau of the government.

During 1919 only four mining concessions were granted, two for working phosphates, one iron, and one zinc. The total number of concessions active on the 1st of January, 1920, was 226, distributed as follows: Coal, 63; zinc and lead, 90; lead and silver, 3; tin and tungsten, 30; gold, 12; copper, 9; iron, 8; antimony, 4; mercury, 3; phosphates, 4. Twenty-two requests for concessions were filed during 1919, and 185 of these requests were under investigation on January 1st, 1920.

Coal

The coal output of Indo-China remained almost stationary in 1919 or 665,000 tons against 636,000 in the previous year, or an average of 645,000 tons during the years of the war. The decrease in stocks from 400,000 to 300,000 tons and the proportionate increase in exports (from 250,000 in 1918 to 350,000 in 1919) brought about a marked improvement in the situation. The coal industry of Indo-China whose development was temporarily retarded by reason of the difficulties surrounding transportation resumed its forward march in 1920 towards the brilliant future that is confidently expected awaits it.

The development of the Phon-me coal basin has not justified the promises held out at first by the extent of the deposit and the exceptional quality of the coal, due largely to the inadequacy of the Sungcan River to serve as their natural outlet to the nearby town of Thainguyen.

The following is an official list of all the mines of Indo-China, with the names of their owners, locality and outputs for 1919:—

Coal Mines

Region of the Bay of Along

1. Hongay Coal Mines.—Province, Quang-yen. Owners, Societe Francaise des Charbonnages du Tonkin. Area, 23,000 hectares. Output, 520,000 tons. Value, 18,800,000 francs. Exports, 336,383 tons, value, 11,600,000 francs. Personnel, 53 whites, 6,188 natives.

2. Kebao Coal Mines.—Province, Quang-yen. Owners, Societe du Domaine de Kebao. Area, 25,000 hectares. Output, 9,866 tons, value, 360,000 francs. Exports, 5,530 tons, value, 230,000 francs. Personnel, 2 whites, 379 natives.

REGION DU DONG-TRIEU

3. FRANCIS COAL MINE.—Province, Quang-yen. Owners, M. Coulet, M. Colonna d'Istria. Area, 374, hectares. Output, 7,500 tons, value, 150,000 francs. Exports, 600 tons, value, 10,000 francs. Personnel, 1 white, 40 natives.

4. HIEN COAL MINE.—Province, Quang-yen. Owners, M. Darmoy, M. Colonna d'Istria. Area, 48 hectares. Output, 3,000 tons, value, 80,000 francs. Exports, 550 tons, value, 20,000 francs. Personnel, 1 white, 40 natives.

5. RENNE COAL MINE.—Province, Quang-yen. Owners, M. Berthet et Charriere. Area, 880 hectares. Output, 18,268 tins, value, 400,000 francs. Personnel, 2 whites, 238 natives.

6. CLOTILDE-LOUISE COAL MINE.—Province, Quang-yen. Owners, Societe des Charbonnages de Dong-trieu. Area, 2,400 hectares. Output, 5,144 tons, value, 180,000 francs. Exports, 701 tons, value, 30,000 francs. Personnel, 4 whites, 165 natives.

7. FABIEN COAL MINES.—Province, Quang-yen. Owners, M. Hguyen-dac-Ton, MM. Cathalan and Perinaud. Area, 724 hectares. Output, 13,560 tins, value, 400,000 francs. Personnel, 1 white, 214 natives.

8. CHACHA COAL MINE.—Province, Haidoung. Owners, Cie Miniere et Industrielle de l'Indo-Chine. Area, 499 hectares. Output, 420 tons, value, 20,000 francs.

9. CHOEDELIN COAL MINE.—Province, Haidoung. Owners, M. Sarran. Area, 1,190 hectares. Output, 14,689 tons, value, 540,000 francs. Personnel, 2 whites, 458 natives.

10. EDOUARD COAL MINE.—Province, Haidoung. Owner, M. Salle. Area, 726 hectares. Output, 20,799 tons, value, 550,000 francs. Exports, 3,500 tons, value, 80,000 francs. Personnel, 3 whites, 333 natives.

REGION DE PHAN-ME

11. LOUISETTE COAL MINE.—Province, Thai-nguyen. Owners, Societe Miniere du Tonkin. Area, 1,600 hectares. Output, 11,314 tons, value, 450,000 francs. Character of coal, lump, with 23 per cent. volatile material.

12. CO-LOUNG COAL MINE.—Province, Thai-nguyen. Owners, Societe Miniere du Tonkin. Area, 2,400 hectares. Output, 5,103 tons, value, 200,000 francs. Character, same as above. Personnel of the two mines, 5 whites, 400 natives.

REGION DE PHU-NHO-QUAN

13. PAUL COAL MINE.—Province, Ninh-binh. Owners, M. Rey, Societe Francaise de Colonization en Annam-Tonkin. Area, 2,399 hectares. Output, 9,887 tons, value, 300,000 francs. Character of coal, semi-lump. Personnel, 2 whites, 223 natives.

REGION DE TUYEN-QUANG

14. ALICE COAL MINE.—Province, Tuyen-quang. Owners, M. Dubreuilli. Area, 387 hectares. Output, 16,027 tons, value, 470,000 francs. Character of coal, lignite. Personnel, 2 whites, 197 natives.

REGION DE CAO-BANG

15. HENRI COAL MINE.—Province, Cao-bang. Owners, M. Vincenti. Area, 900 hectares. Output, 338 tons, value, 10,000 francs. Character, lignite. Personnel, 5 natives.

REGION DE NONG-SON

16. NONG-SON COAL MINE.—Province, Quang-nam (Annam). Owner, M. Debeaux. Area, 3,000 hectares. Output, 9,198 tons, value, 320,000 francs. Exports, 6,886 tons, value, 250,000 francs. Personnel, 2 whites, 55 natives.

Wolfram and Tin Mines

REGION OF PIA-OUAC

1. ST. ALEXANDRE MINE.—Province, Cao-bang (Tonkin). Owners, Societe des Etains et Wolfram du Tonkin. Area, 680 hectares. Character of deposit, veins. Output, 83 tons wolfram and iron, not sold.

2. STE. ADELE MINE.—Province, Cao-bang. Owners, Societe des Etains et Wolfram du Tonkin. Area, 160 hectares. Character, alluvial. Output, wolfram, 133 tons, value, 400,000 francs. Cassiterite, 128 tons, value, 600,000 francs. Exported, wolfram, 40 tons, value, 120,000 francs, tin, 81 tons, value, 700,000 francs. Minimum mineral content of ore, wo 3-68 per cent.; sn 65 per cent. Personnel, 15 whites, 914 natives.

3. BEAUSITE MINE.—Province, Cao-bang. Owners, Societe des Mines d'Etain du Haut Tonkin. Area, 500 hectares. Character of mine, alluvial and veins. Output, mixed, 61 tons, value, 220,000 francs. Exports, 10 tons, value, 35,000 francs. Minimum mineral content wo 3 33 per cent.; sn 3-33 per cent. Personnel, 2 whites, 141 natives.

4. ANDREE MINE.—Province, Cao-bang. Owner, M. Phan-van Co., operating company, Societe Civile des Mines d'Etain et Wolfram du Pia-ouac Est. Area, 237 hectares. Character, alluvial.

5. ALEXANDRE MINE.—do. Owner, M. Ng-van-vein, operating company, same as above. Area, 245 hectares. Character, alluvial.

6. ROBERT MINE.—do. Owner, M. Bui-xuan-Khoai, operated by same as above. Area, 245 hectares. Character, veins.

7. MINOS MINE.—do. Owner, Me. Phan-thi-Dien, operated by above company. Area, 154 hectares. Character, veins.

8. MAN-MUC MINE.—do. Owner, M. Phan-van-Co, operated by above company. Area, 596 hectares. Character, veins.

Combined output of above group, 48 tons mixed; value, 150,000 francs. Exported, 78 tons mixed, value, 250,000 francs. Minimum mineral content, wo 3-43 per cent.; sn 22 per cent.; Personnel, 4 whites, 150 natives.

9. ARIANE MINE, 288 hectares. PHEDRE MINE, 456 hectares. GANYMEDE MINE, 450 hectares. Province, Cao-bang. Owners, Societe des Mines du Pia-ouac. Character, alluvial and veins. Combined output of group, 59 tons, value, 190,000 francs. Exported, 56 tons, value, 186,000 francs. Minimum mineral content, wo 3-30 per cent.; sn 30 per cent.; Personnel, 2 whites, 127 natives.

Zinc Mines

REGION DE TUYEN-QUANG

1. TRANG-DA MINE.—Province, Tuyen-quang, Tonkin. Owners, Societe des Mines Trang-da. Area, 800 hectares. Output, 3,500 tons, value, 300,000 francs. Minimum mineral content. Personnel, 11 whites, 577 natives.

REGION DE CHO-DIEU

2. RUBIS MINE.—Province, Bac-kan (Tonkin). Owner, M. G. Bault. Area, 793 hectares. Output, 21 tons, galena. 9,476 tons zinc, value, 3,300,000 francs. Exported 1,000 tons, value 350,000 francs. Personnel, 7 whites, 568 natives.

REGION DE SONG-NANG

3. ALEXANDRE MINE.—Province, Tuyen-quang, Tonkin. Owners, Societe des Mines de Pac-van. Area, 900 hectares. Output, 430 tons, value, 150,000 francs. Personnel, 7 whites, 225 natives.

Total Zinc Mines. 3 concessions. Area, 2,493 hectares. Output, 15,934 tons, value 4,750,000 francs. Exported, 1,000 tons, value, 350,000 francs. Personnel, 25 whites, 1,370 natives.

Iron Mines

REGION OF PHUC-NINH

1. NGOI-TON MINE.—Province, Tuyen-quang. Owners, MM. Perrin Freres and M. Leroy. Area, 450 hectares. Output, 1,400 tons, value 20,000 francs. Ore, 61 per cent.

REGION OF LA-PHU

2. LA-PHU MINE.—Province, Phu-tho, Tonkin. Owner, Societe Anonyme Francaise de Colonisation en Annam-Tonkin. Area, 900 hectares. Output, 900 tons, value, 18,000 francs. Ore, 63 per cent.

Region of Phi-liet

3. Argonne Mine.—Province, Haidoung, Tonkin. Owner, M. Nougaerde. Area, 900 hectares. Output, 200 tons, value, 2,000 francs. Ore, 40 per cent.

4. Kim-bao Mine.—Province, Haidoung, Tonkin. Owner, M. Vu-van Co. Area, 900 hectares. Output, 150 tons, value, 2,000 francs. Ore, 45 per cent.

5. Chau-hai Mine.—Province, Kien-an, Tonkin. Owner, M. Nguyen-huu-Lan. Area, 900 hectares. Output, 1,400 tons, value, 10,000 francs. Ore, 35 per cent.

Region of Doanh-xa

6. Paul Mine.—Province, Thanh-hoa, Annam. Owner, M. Rey. Area, 900 hectares. Output, 900 tons, value, 14,000 francs. Ore, 48 per cent.

Region of Do-cam

7. Priola Mine.—Province, Vinh, Annam. Owners, M. Malaurie, M. de Monpezat. Area, 900 hectares. Output, 150 tons, value, 2,000 francs. Ore, 48 per cent.

Total, Iron Mines: 7. Area of concessions, 5,850 hectares. Output 5,100 tons, value, 68,000 francs.

Phosphate Mines

Region of Than-moi

1. Arthur Blanc Mine.—Province, Langson, Tonkin. Owner, Societe des Phosphates du Tonkin. Area, 900 hectares. Output, 4,100 tons, value, 530,000 francs. Phosphate content, 44 per cent. Personnel, 1 white, 200 natives.

Region of Kampot, Cambodia

2. Madeleine and Marguerite Mine.—Province, Kampot. Owner, M. Mayeur. Area, 900 hectares each. Output, Madeleine, 2,500 tons, Marguerite, 450 tons.

Total Phosphate Mines: 3. Area, 2,700 hectares. Output, 7,050 tons.

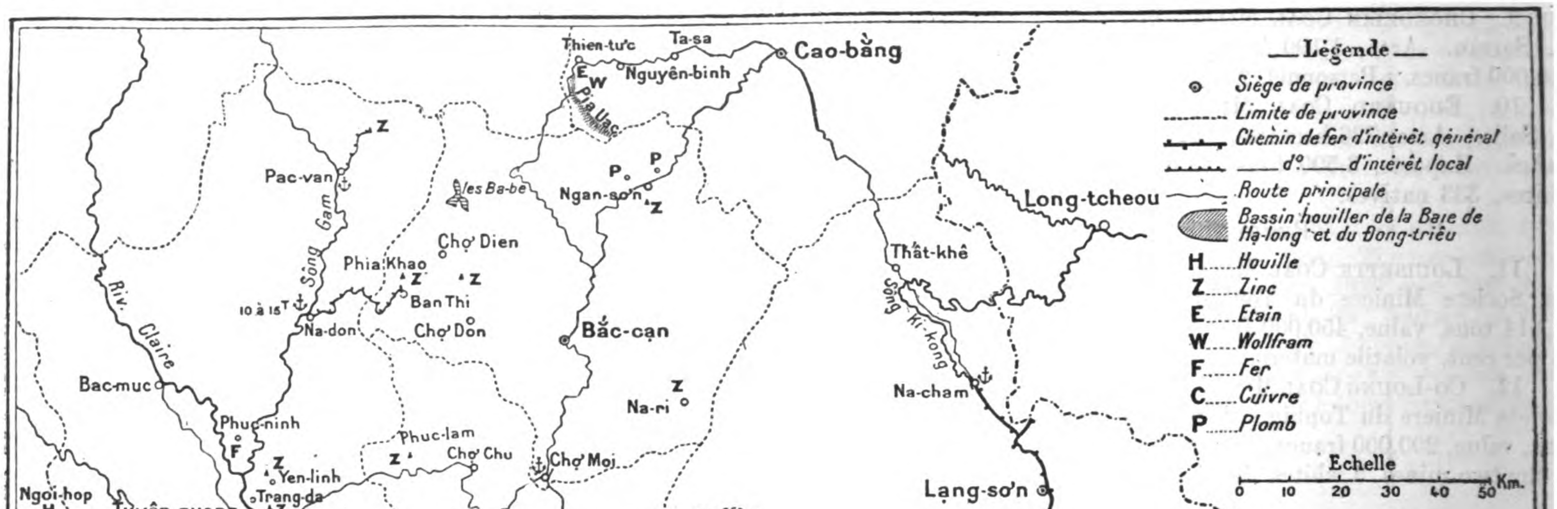
Graphite Mines

Region of Hung-nhoung

* 1. Severine Mine.—Province, Quang-hgai, Annam. Owner, M. Leoni. Area, 900 hectares. Output, 7,451 tons, value unknown. Exported, 7,451 tons.

Region of Lao-kay

2. La Banniere Mine.—Province, Lao-kay, Tonkin. Owner, M. Dumond. Area, 900 hectares. Output, 90 tons.



MINING MAP OF INDO-CHINA

Hydro-Electric Enterprises in Formosa

THE British consul at Tamsui, in a recent report to the department of overseas trade, gives a most interesting account of the development of hydro-electric plants in the island of Formosa. He says that the first hydro-electrical undertaking was initiated in 1902 by a company which was formed to utilize the falls of the Shinten River, in the Taihoku province, the object being to produce power for supplying light to the city of Taihoku. The Formosan government, however, decided to place the supply of electricity under its own control, and it accordingly took over the Shinten scheme. The first power station was opened in 1905 and a second followed in 1909, the two together having a total capacity of 4,000 horse-power. They were followed during the next few years by other power stations, as below :—

Year.	Situation.	H.P.	Towns supplied.
1909 ..	Chikushinmon	2,000	Tainan and Takao
1911 ..	Daian River	1,200	Taichu and Shoka
1917 ..	Rono-kei (upper course) ..	4,000	Tainan and Takao

Lake Candidius Scheme

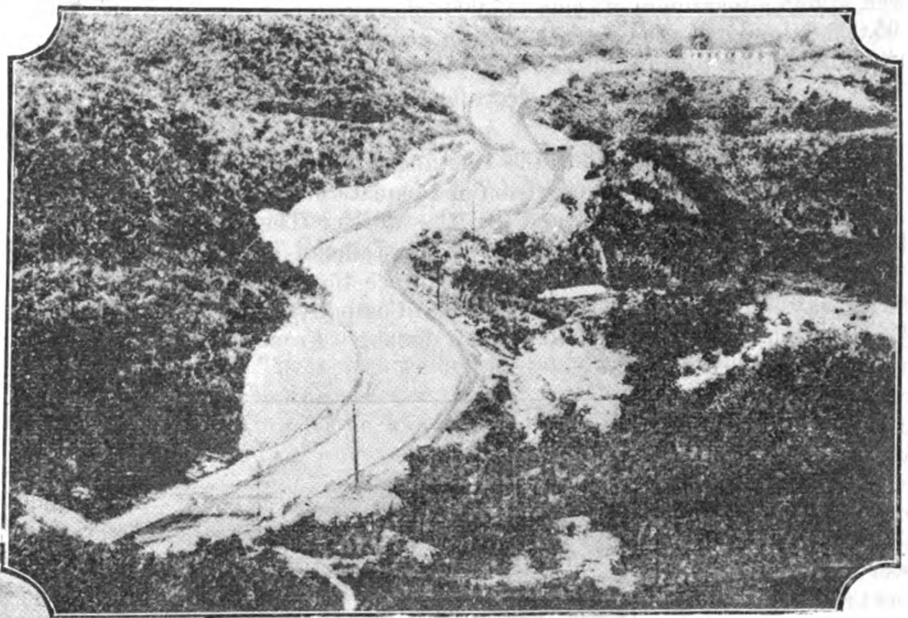
The industrial development occasioned by the European war brought about an increased demand for electric power, and a big project was formed to utilize the waters of the Dakusui River and of Lake Candidius, which is the largest lake in Formosa and lies almost exactly in the centre of the island. In order to facilitate the carrying out of this scheme, the Formosan government decided in 1919 to float a semi-official limited liability company to take over all the government's electrical undertakings. This company received a concession for the Lake Candidius scheme and commenced work in 1920. The date of completion is as yet somewhat vague; the year 1924 was at first spoken of, but it is likely that the actual date will be a year or two later. The estimated cost of the undertaking is Y. 48,000,-000, apportioned as follows :

	Yen.
Civil engineering constructional work ..	19,900,000
Electrical constructional work	26,500,000
Business expenses	1,600,000
	48,000,000

The scheme provides for leading water from the river Dakusui from an intake in the Shimaigahara region into Lake Candidius—the Japanese name of which is Jitsugetsutan—which will act as a reservoir for the water needed for the power station. The river Dakusui rises in the mountains of Central Formosa and makes its way first southwards and then turns westwards, passing within less than three miles of Lake Candidius, and on into the sea. The slatey character of the soil through which it passes in its upper course renders its waters muddy and gives it its name of "Muddy Water River." Candidius is a mountain lake some 6 square miles in area, lying at a height of 2,400-ft. above sea level. At present it is gradually drying up, but when the waters of the river are let in its surface will be raised 75-ft. The waterway from the river Dakusui to the lake will be 12½ miles in length, apportioned as follows :

Nature of waterway.	Number.	Length. Yards.
Tunnels	12	19,364
Covered cuttings	5	1,236
Open cuttings	11	842
Aqueducts	6	402
		21,844

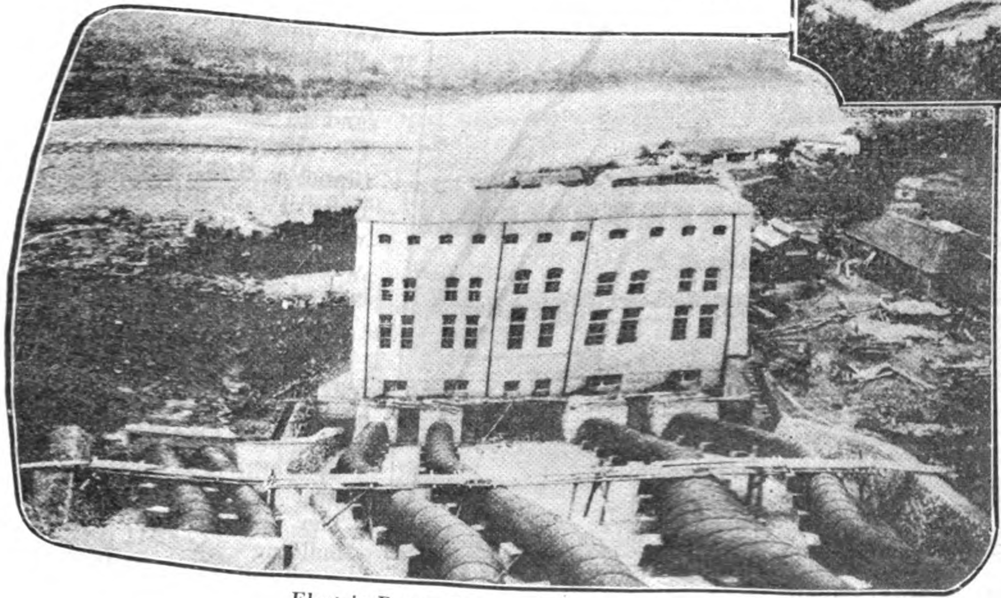
A settling pond is also to be constructed in the hope of depositing some of the mud and sand carried by the waters, since



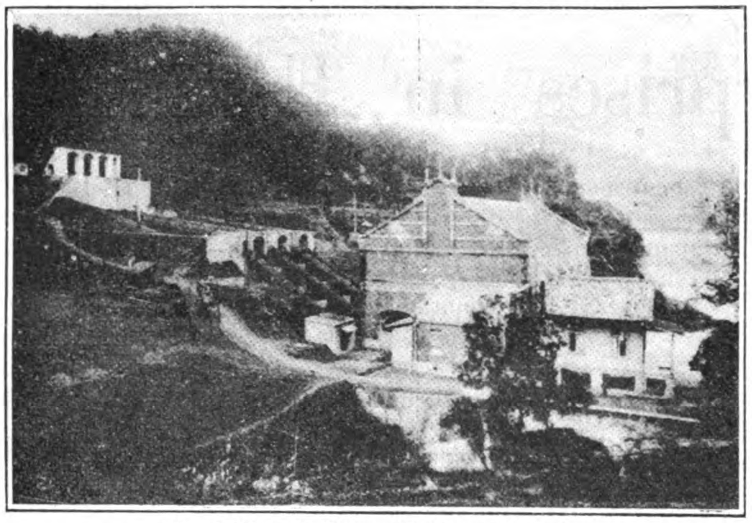
Electric Power Station at Chikushimon and Tail Race

the river water in its present condition would mar the beauty of the lake, and it is feared, moreover, that it might kill the fish which exist in it. At two points on the lake's western shore, where the banks are low, dams will be constructed of the following dimensions :—Suisha dam: height, 100-ft.; length, 1,800-ft.; Tosha dam: height, 60-ft.; length, 1,000-ft.

The water will leave the lake by a tunnel two miles long and will be taken down in pipes to the power station at Monpaitan, the fall being 1,100-ft. The volume of water at the intake on the river Dakusui will vary between a minimum of 300 cubic feet per second and a maximum of 1,600 cubic feet, or an average of 954 cubic feet, which, it is calculated, should allow a steady flow at the exist from the lake of 900 cubic feet per second.



Electric Power Station at Doryuwan



No. 2 Electric Power Station at Kosoko

No. 1 Electric Power Station at Kameyama

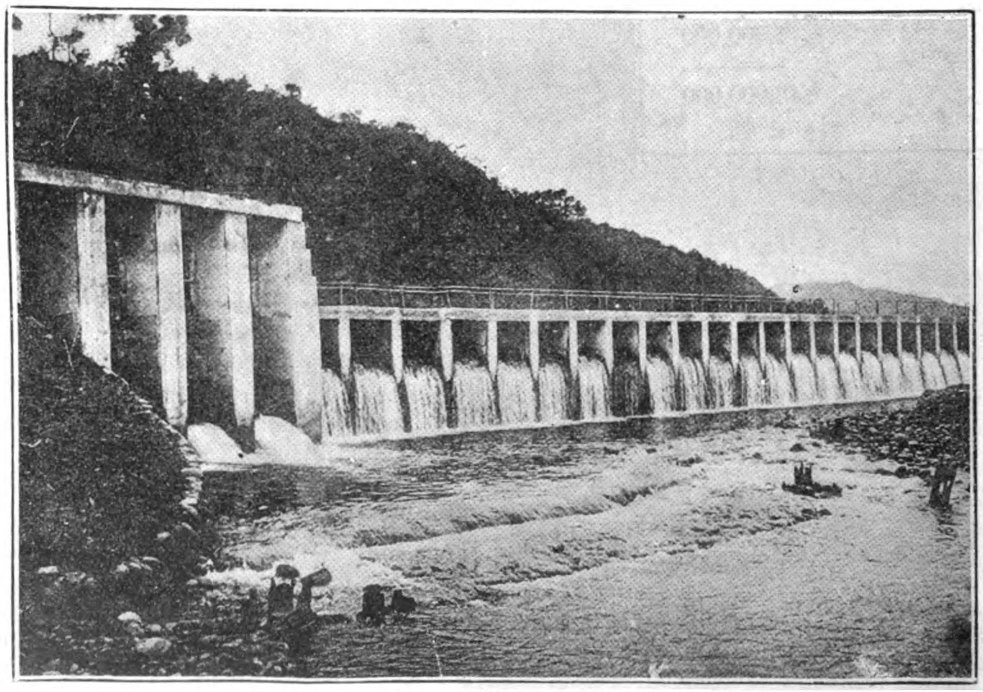
At ordinary times, allowing for the 1,100-ft. fall mentioned above, it is expected to generate a maximum of 140,000 horse-power, or 100,000 kilowatts, with a minimum of 65,000 kilowatts.

The tunnels will be of horseshoe cross section, and those above the lake will be 19-ft. high by 17-ft. wide, while those leading to the power station will be 15.7-ft. high and 14-ft. in width. It is hoped eventually to construct a second power station some four miles below the first, the water being again carried through tunnels to the point required. A fall of 465-ft. will be obtained, and it is hoped to generate a maximum of 62,000 horse-power. The two stations together would thus produce 202,000 horse-power, giving a maximum of some 145,000 kilowatts, or an average of 95,000 kilowatts. The intention is on completion of the first part of the scheme to transmit electrical energy for light and power all over the island, and the entire electrification of the government railway system is even spoken of.

The first step requisite for the carrying out of the scheme described above has been the provision of adequate means of communication in the region covered by the works. The nearest railway station is Nisui, on the main Keelun-Taihoku-Takao line of the Formosan Government Railways, whence the Nisui-Nanto light railway line operated by the Meiji Sugar Company is available as far as the hamlet of Nama, a few miles distant. From Nama a "push car" line runs through Monpaitan, the site of the future main power station, to the town of Horisha and on to Hokusanko, where the preliminary power station is being constructed. The "push cars," it is explained, are small flat-topped trucks running on an 18-in. gauge line, and they are pushed by coolies or, in the case of heavy loads, drawn by oxen.

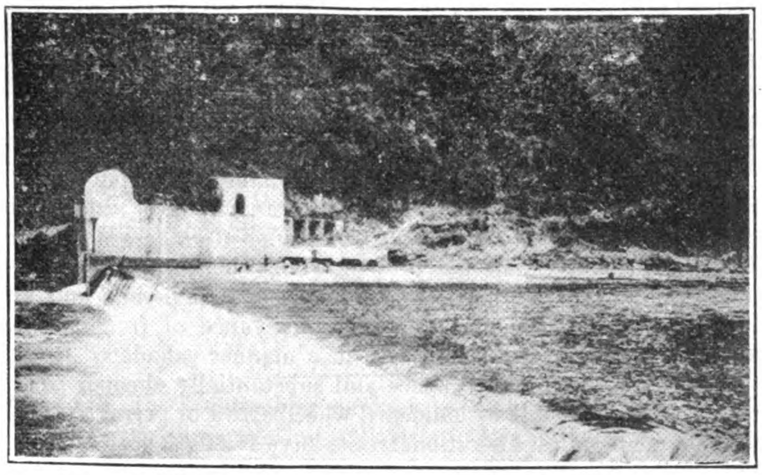
This line would have been utterly inadequate to carry the heavy plant and materials required for the execution of the work, so it has been necessary to provide other facilities. A railway of the same gauge as the Formosan government lines, 3-ft. 6-in., is accordingly being built from Nisui to Monpaitan, and from Gaishatei, about one mile below Monpaitan, an aerial ropeway will run to a point above the western shore of Lake Candidius. There, connection will be made with a light railway, operated by electricity and running as far as Suma-an, situated some two miles in a north-easterly direction from the lake, where the offices of the construction department of the company were established in January last. A network of other light railway lines will be constructed for the transport of plant and materials to the various points at which work is to be carried on. Thirty-three miles of light electric railways, 20 miles of "push-car" lines, and 10 miles of aerial ropeways are being constructed, in addition to the line already mentioned from Nisui to Monpaitan.

No electric power being at present available for running the electric lines and ropeways mentioned above and for working the rock drills for piercing the tunnels, it has been necessary to construct a special power station for those purposes. The site selected is at Hokusanko, some four or five miles below the town of Horisha, in the gorge of the Nanko River. A concrete dam with an intake on the right bank of the river has been constructed, and the water will be led through tunnels one mile in length to a point lower down the course of the river, where the power station is now in process of erection. For excavating the rock through which the tunnels pass compressed air drills have been used. On the way down the water will pass through a settling pond for the sand to be deposited. The height of the tunnel is 8-ft. and the breadth about 7-ft., while the depth of the water in the tunnel will be about 7-ft. The fall of water at the power station will be 172-ft. The side walls of the tunnels are faced with brick and the floor is constructed of concrete. The power station building itself was practically completed



Control Dam at (清水坑) Shimizuko

at the date of the consul's report and the plant was in course of erection. The latter comprises two turbines, each developing 1,200 horse-power. It was expected to complete the installation early in the month of June. Great difficulty was experienced in hauling the heavy machinery up the "push-car" line described above, but the task was accomplished without loss or serious accident. Another difficulty which had to be contended with was the prevalence of malaria in the Hokusanko



The No. 2 Electric Power Station Dam

gorge, which, though it lies at an altitude of some 1,500-ft., is said to be one of the worst malaria spots in the island.

The steam railway line from Nisui as far as Gaishatei was expected to be opened in June and the remaining section, from Gaishatei on to Monpaitan, about August. On this latter section a good deal of tunnelling and other work remains to be done and completion may be delayed. The aerial wireway and light railway lines are also all expected to be completed about August next.

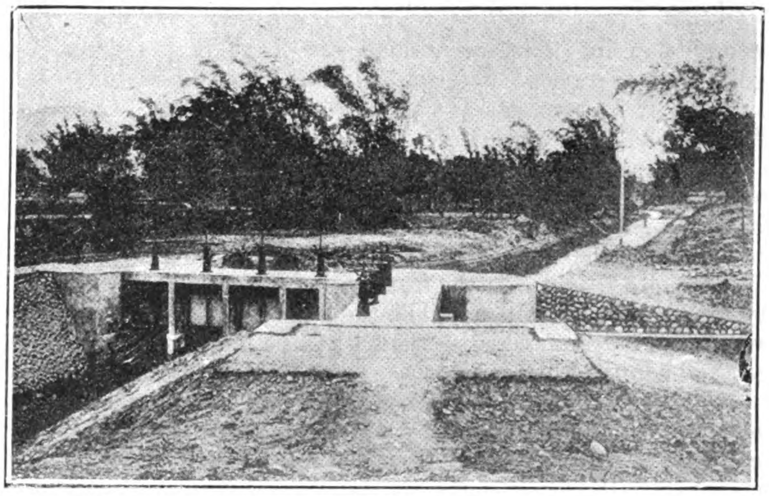
The constructors are fortunate in the practical absence of labor troubles. Labors is plentiful and wages average about Y. 1.20 to Y. 1.50 per day for male laborers and 75 to 90 sen for women. These are, of course, the figures for Formosans, the rates paid to Japanese being considerably higher. The "push-car" coolies are the highest paid of any unskilled labor, their day's wage, it is said, running as high in some cases as Y. 4 or Y. 5. About 4,000 laborers were being employed by the company in constructional work. The prevailing business depression was of benefit to the company, in that it cheapened the rate wages and lowered to some extent the cost of raw materials.

Pending completion of the big scheme, steam power stations are to be constructed at Keelung and Shokwa to furnish additional light and power for the needs of those towns and their vicinity. The Keelung station has already been begun, and work will soon be commenced on that at Shokwa. Keelung enjoys the advantage of cheap fuel, the principal coalfields in the island being situated in its immediate vicinity.

Formosan Electric Power Company

On a much smaller scale than the Lake Candidius project and requiring less time for completion is the installation now under construction in the Giran district of Taihoku province, on the east coast. It was begun as a private enterprise of the Tainan Sugar Company, but the big Taiwan Electric Power Company desired to take a share. It was then decided to form an independent company under the name of the Taiwan Denki Kogyo (Formosa Electrical Enterprise) Company with a capital of Y. 6,000,000, divided into 120,000 Y. 50 shares, of which some were taken up by the Tainan Sugar Company, some by the Taiwan Electric Power Company, some by individual promoters, and the remainder by the general public. The company may eventually be amalgamated with the Taiwan Electric Power Company. Among the promoters are the majority of the most prominent names in the Japanese financial world, such as Mitsui, Iwasaki (Mitsubishi Company), Kaneko (Suzuki & Co.), Okura, Tankata, Asano, Watanabe Kaichi (Ishikawa Shipbuilding Company, Tokio), Wade (Fuji Spinning Company), Yamashita (the shipping magnate), Fujiyama (president of the Tokio chamber of commerce), and others.

The scheme provides for conducting water from the upper course of the river Dakuaui (Giran), a distance of about five miles



The Shimizuko Sluice and Head Gate

to Lake Kyukyute, on the bank of which a power station will be built. This involves the cutting of a tunnel over half a mile long, on which work will soon be commenced. The foundations of the power station are already nearly completed. The site is said to be an ideal one, and there are, moreover, other excellent sites further down the course of the river where supplementary power stations can be erected if needed. Work was begun in June, 1920, and it is hoped to have the first power station in operation by the end of 1921 at the latest. A fall of 900 cubic feet of water per second will be obtained and the installation will have a capacity of 10,000 horse-power, or 7,500 kilowatts. A large proportion of the power will be transmitted to the city of Taihoku, some 27 miles distant as the crow flies, and taken over by the Taiwan Electric Power Company. The latter company is under contract to defray the expense of erecting the transmission lines from the installation to Taihoku, and the survey of the route has already been taken in hand. The contract for the erection of the installation—other than the transmission lines mentioned above—has been let to the Okura Gumi, and work is progressing satisfactorily. Owing to the favorable nature of the locality, the cost of erection of the installation has been estimated at only Y. 471 per kilowatt, as compared with Y. 600 to Y. 700 or even as high as Y. 1,000 per kilowatt in Japan.

The Giran district is as yet undeveloped, but it is rich in coal, timber, sulphur and marble. A railway, which will connect the town of Giran with the Taihoku-Keelung line at Hatto, is under construction. Owing to the mountainous nature of the country the line is roundabout and construction difficult, and there is a gap of some 15 miles still to be built, on which work is proceeding apace. It is hoped to use the power produced by the present scheme for the development of the natural resources of the district. The marble will be used for the manufacture of carbide, and eventually it is intended to undertake cement manufacture and the production of timber. The promoters speak of starting work on a second power station in the year 1923 and of following that by a third. On the completion of the latter it is proposed to undertake the production of a nitrogenous fertiliser from the air, but that part of the program is decidedly remote.

Projects also exist for the utilization of the water of the river Daiko, in Taichu province, and of the river Dakko, in Takao province, while a further scheme in Taito prefecture, on the east coast, has been projected by the Taito Sugar Company.

Railless Trams for Shanghai

THE far-seeing management of the Shanghai Tramways whose expansion is considerably handicapped by the restrictions imposed by the authorities, is seeking to solve some of their problems by the increasing use of railless trams. This system has given such favorable results that several new cars have been ordered and will soon be in service. The chassis frames have been manufactured by John I. Thornycroft & Company, Ltd., at their Basingstoke Works, while the car bodies and a number of other parts were built at the works of the Tramway Company in Shanghai. The cars are designed to be driven with a single 40 horsepower ventilated motor supplied by the English Electric Company, Ltd. They are divided into two compartments, the first class being at the front; they are also provided at the front with double lifeguards designed by the Tramway Company while the sides between front and rear wheels are fully protected so that it will be impossible for passengers to be injured by the wheels.

The history of railless cars in Shanghai is contained in the following summary written by Mr. Donald McColl, the general manager of the Shanghai Electric and Construction Company who operate the local tramways:—

"We have had a preliminary railless electric route in operation for nearly six years—a year more than the life of motor omnibuses as stated by the London General Omnibus Co. Our experience shows that the efficient life of railless electric cars will be incomparably longer than that of motor omnibuses.

"The railless electric principle affords speed, carrying capacity and flexibility equal to the motor omnibus on fixed routes; where the volume of traffic justifies the provision of large public-service vehicles regular routes rather than occasional haphazard services, are required.

"For roads which are too narrow for double track tramways and with traffic requiring more frequent services than could be run on single track tramways, the railless electric system is the most suitable. Railless cars have the necessary flexibility to thread their way through traffic which would hold up cars confined to rails.

"The railless system is free from certain interruptions to service inseparable from the rail system on which the breakdown or derailment of a single car may hold up a long line of other cars. A disabled railless car can immediately be moved to the side without interruption of the service. A railless electric service has much greater carrying capacity than a single track rail system. For this reason, railless ought to replace the single track rail system on roads which cannot be sufficiently widened for double track and on which a more frequent service is required.

"Double deck dirigible railless vehicles would be subject to the same objection as the double deck rail car inasmuch as the average speed would tend to be less than that of the single deck vehicle on busy routes owing to the time taken by passengers in going up and down stairs at frequent stops. On the whole, the case is stronger for the single deck railless car than for the double deck type for conditions here.

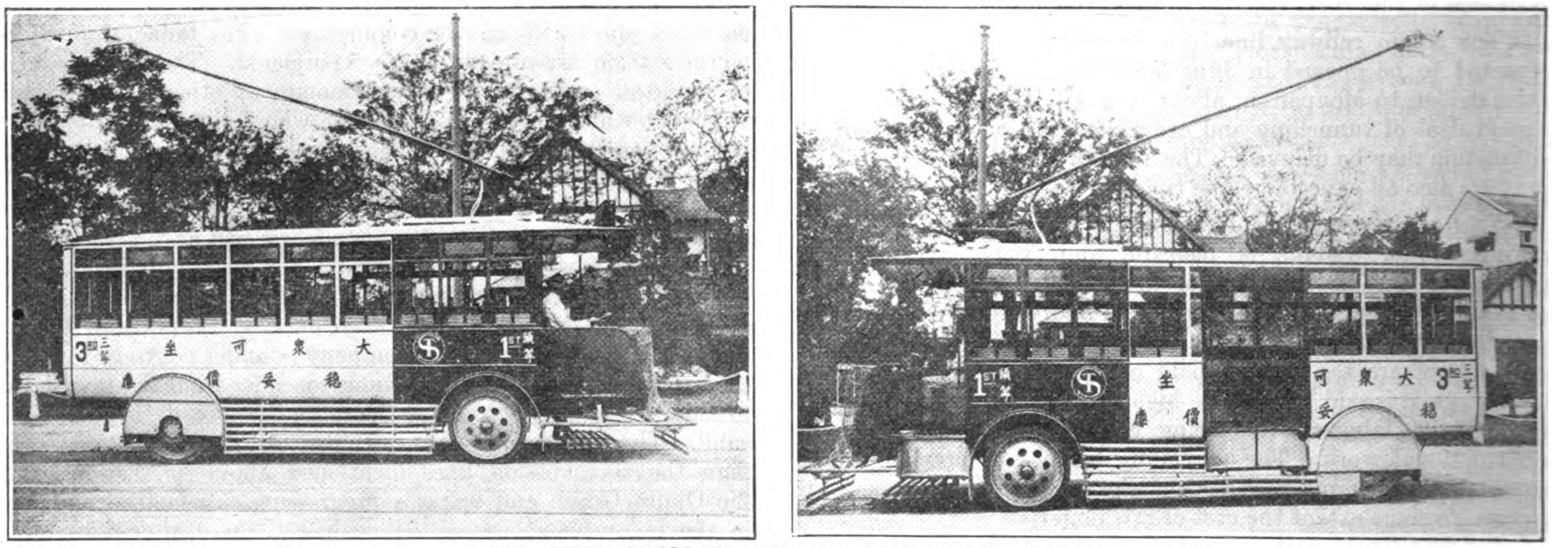
"Published correspondence has acquainted the public with the repeated proposals made by the Tramway Co. during the last few years for a comprehensive scheme of railless extensions designed to supplement the present wholly inadequate passenger services as far as road and bridge facilities will permit and also to relieve the situation as regards conveyance of freight which urgently requires to be dealt with in a manner calculated to give the utmost saving of road space and substantially cheaper freight rates than are possible by handcart, wheelbarrow or petrol trucks.

"Some 16 miles of additional route have at length been approved but the much more onerous terms requested by the council than those for the preliminary railless route render it impossible so far to proceed with the scheme. The high gold prices of imported equipment now ruling involve, at present exchange, much higher capitalization than would have been required early in 1920.

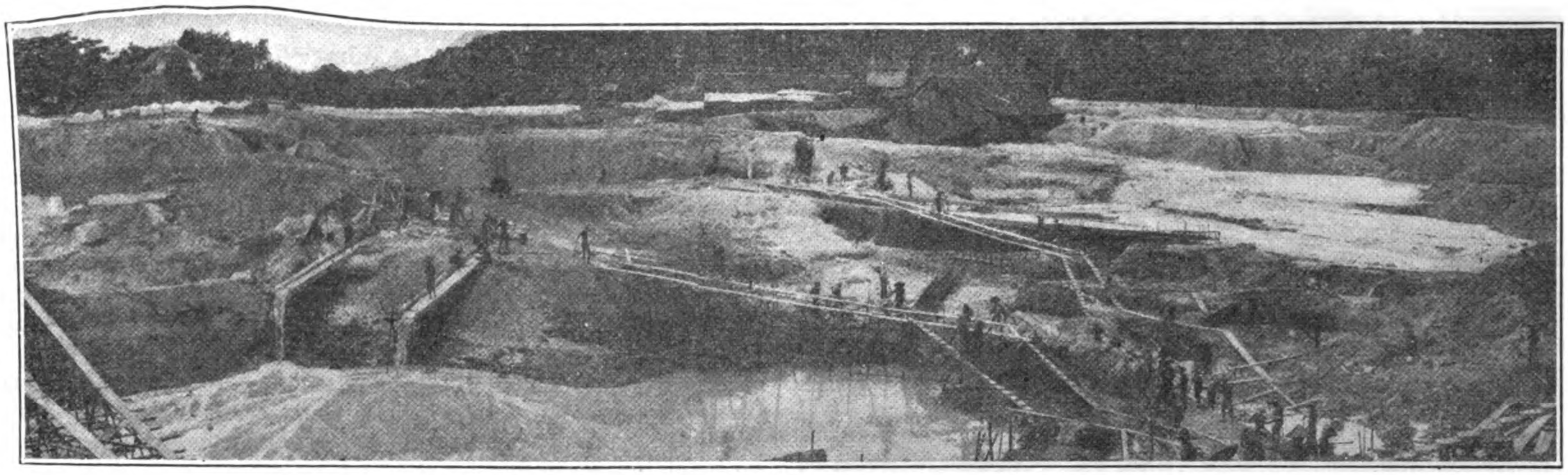
"Successive councils of this settlement seem to have been obsessed by the idea, for which no precedent exists in any part of the world, that the low fares paid by the mass of the population for traveling by the public traction system are the source from which to seek heavy contributions for reconstruction of roads and bridges and other revenues beyond all comparison in excess of the merely nominal license fees levied on other vehicles making similar demands upon roads and bridges. The extensions in question would provide an opening for not much more than 100 railless passenger motor cars.

"Already there are some 200 petrol freight trucks licensed at low rates; and these vehicles are knocking the unprepared roads to pieces.

"At a moderate computation electric traction facilities for 400 million passengers per annum will be required in the foreign settlement within the next few years. This would call for at least 60 miles of route or for the combined administrative areas of Shanghai, 120 miles of route to transport 700 to 800 millions of passengers per annum.



THE NEW RAILLESS TRAMS FOR SHANGHAI



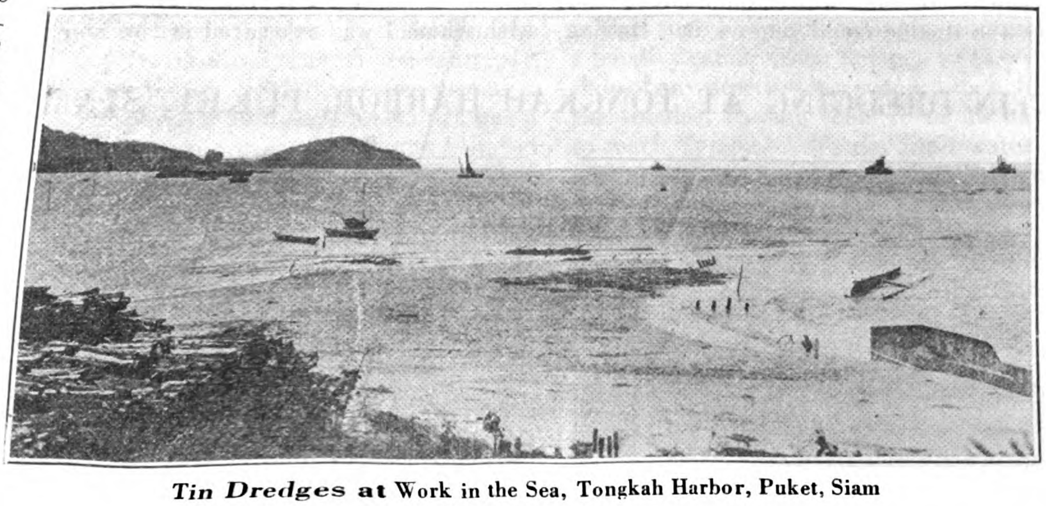
Open Cast Tin Mine at Puket, Siam, showing Sluice; Depth to "Karang" or Tin Bearing Stratum, 25 feet

Tin Dredging in Siam

IN the September number of THE FAR EASTERN REVIEW appeared an article on "Mining in Siam," which gave the particulars as to output and other general data concerning the tin industry of that country. The most important mining development was the introduction of dredges by the Tongkah Harbor Tin Dredging Company, Ltd., who have steadily increased their plant until at the present time they have five dredges at work. The two newest of these have a monthly capacity of about 80,000 cubic yards per month. The example of the Tongkah Harbor Company was soon followed by the Siamese Tin Syndicate and the Renong Dredging Company, who will soon have a total of five dredges at work in Renong. The amount of tin obtained from these dredges is given at 64,992 piculs for 1919-20 as against a total of 74,861 piculs obtained by other mining methods.

The development of tin dredging forms a most interesting chapter in Far Eastern engineering work. Some time ago the founder of the Tongkah Harbor Enterprise, Captain E. T. Miles, of Melbourne, placed on record in the *Industrial Australian and Mining Standard* the history of the early struggles to overcome the prejudices to this new departure in tin mining in Siam. It is worthy of note that the dredging industry in Siam and Malaya owes its inception and finances to Australian initiative, the same as in the Philippines. Captain Miles' story is worth quoting in full.

Much has been said and written at various times on the origin of tin-dredging in Siam and Malaya, most of it erroneous, some with a smattering of truth. Men who were the greatest pessimists, who did their best to block the flotation of the pioneer company, and ridiculed the idea of successfully dredging tin from Tongkah harbor, have since publicly claimed the credit of being the pioneers of tin-dredging in Siam and Malaya. For record purposes I propose to state a few facts on the origin of the industry.

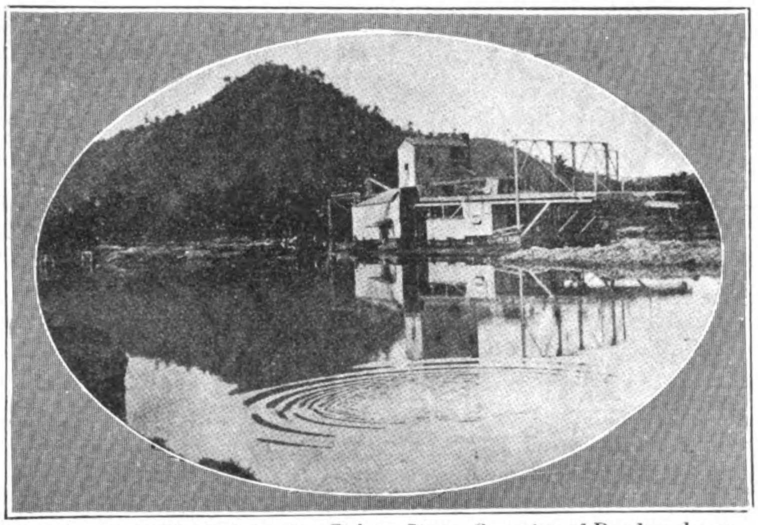


Tin Dredges at Work in the Sea, Tongkah Harbor, Puket, Siam

On the invitation of the late H.E. Phya Raseda, high commissioner of Western Siam, I went to Tongkah in 1905 to investigate what was then known as the government compound, an area of about 50 acres in the centre of the township, on which stood all the government buildings, comprising the high commissioner's and the governor's offices, treasury, mines office, gaol, police office, etc. This area was practically all that was left unworked of the valley which Chinese had been working for tin for 60 or 70 years. Starting from the foot-hills, they had worked down the valley to the foreshores of the harbor, and by means of a series of cofferdams for a quarter of a mile into the shallowest part of the harbor, leaving unworked the compound. This latter had been extensively bored by a government boring gang, under Boring-Superintendent McLellan. I carefully checked the bores, and satisfied myself that this area would average about 2-lb. per cubic yard, but, while the government had fixed their compensation for removal of buildings at about £20,000, compensation to private owners was left for settlement between the parties, and was consequently an unknown quantity. I pointed out to the high commissioner that this unknown quantity would be a bar to the flotation of a company in Australia or elsewhere, and advised him to have the value of private improvements assessed and added to the government's compensation, so that the actual cost could be shown to promoters. This was done some years later, the outcome being that A. W. Palfreyman courageously came to the rescue on the last days of the option and took a huge liability, resulting in the flotation of the Tongkah Compound Co., which has been exceedingly profitable to all concerned. But it must be remembered that at this later period the Tongkah Harbor Co. had been at work for some considerable a time, and had demonstrated that ground of similar character to the compound could be worked for 4d. per yard. Without that knowledge anyone asking the business men of Australia to put up £50,000, plus the cost of a dredge and plant to work 50

acres of ground, would have been regarded as fit inmate of a lunatic asylum.

At the time of my visit to Tongkah about 600 coolies were, by means of a series of cofferdams, working two open lombongs at least a quarter of a mile out in the harbor, beyond original high-water mark; and while at this time the financial difficulties



Tin Dredge at Work Inland at Puket, Siam. Capacity of Dredge about 65,000 cubic yards per month.

of the compound seemed insuperable, the harbor and its possibilities appealed to my nautical instincts. I feel sure that the ordinary mining engineer would not have tackled the harbor at that time, for it was more a marine than an engineering problem. Chinese are very jealous of any stranger, particularly a European, going into their mines, but an introduction from the high commissioner removed all disabilities as far as I was concerned, and I had free access to the workings, and was consequently enabled to ascertain, by personal observation, the number of men employed, the quantity of cassiterite produced daily, and the nature and extent of the *karang* (tin-bearing gravel). Above all, the mines being dry, I had an opportunity of seeing what no other European has since seen, the character of the overburden from surface to *kong* (the bottom under *karang*), and I was convinced that similar clay overburden in the harbor would stand the test of dredging.

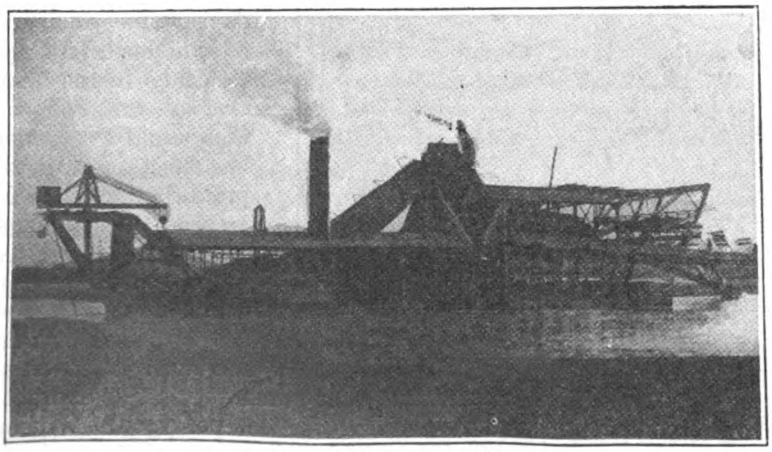
Whether Tongkah harbor could be successfully and profitably worked by dredging depended upon whether, in opening a paddock, the banks would stand, or whether, with the ebb and flow of the tide, together with the ocean swell, the banks would fall in and fill the paddock as fast as the dredge could remove it. Having satisfied myself on this point, the next move was to ascertain how far the deposit extended into the harbor, and whether the depth was within the limits of economical dredging. I borrowed a boring set and put down sufficient bores in the harbor to satisfy myself that the deposit extended at least a mile into the harbor, and that it was of the same value and character as that seen in the open mines.

The problem before me thus was: Can the harbor be worked to pay 15 or 20 per cent. interest, and return the invested capital during the life of the mine with 70 per cent. concentrate, worth only 8d. per lb.? Metallic tin was then about £125 per ton. I had estimated the cost of working the lombongs by Chinese methods at 1s. 1d. per cubic yard, and concluded that as the same ground could be worked by dredge at about 4d. per yard, there must be a huge profit. Holding this view, I made application to the high commissioner for a mining concession for the harbor, but was met with a refusal, on the ground that the working of the mine so far seaward was causing their only channel, which carried all the traffic, to silt up, and the government had refused the Chinese permission to mine any further seaward on that account. This raised the "dock and channel" question, about which so much was said and written a few years back by ill-informed critics. After full consideration. I undertook, if the government gave me the sole right to dredge the whole of the harbor (about 6 square miles) to dig a dock and a channel thereto, 20-ft. deep. I made a glowing picture of a dock, with all the gunboats, steamers and tonkongs discharging at a wharf, instead of lying three miles off and discharging into lighters, and impressed the officials with the advantages, both in cost and convenience. About this time Prince Dameong, then minister for the interior, came to Tongkah, and I discussed the possibilities with him, with the result that he instructed me to prepare a draft concession for his approval, and present it at the mines department at Bangkok. The original draft I have in my possession, and it is very gratifying to me that it ran the gauntlet of a special commission, which included officials of the highest standing in the Siamese government, both Siamese and European, and came through without any appreciable alteration from the original text.

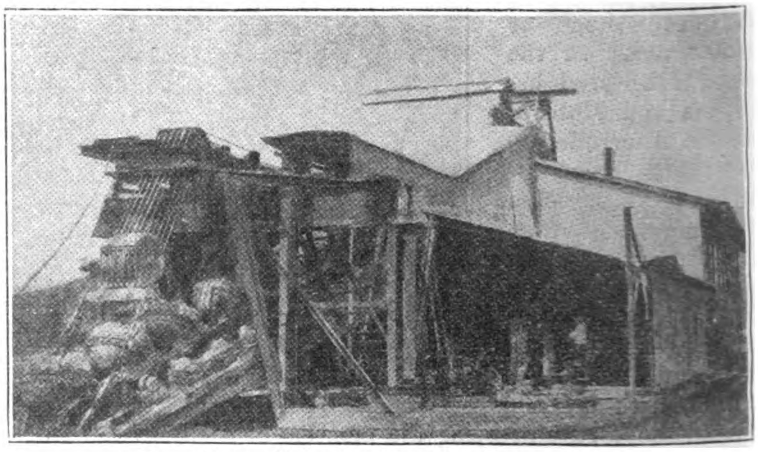
It is a matter of history that some years later the Tongkah Harbor Co. compromised with the Siamese government, and, in lieu of digging the dock and channel, agreed to pay £35,000, spread over 5 years, and do some minor dredging in the boat channel. It is worthy of note that previous to this compromise I had offered the Tongkah Harbor Co. a very large sum for the right to dig the dock and channel, taking as compensation for the work the tin recovered from the area during the operations.

After securing the concession, the feasibility of dredging the harbor profitably was still doubted. At one stage the friends with whom I was associated in the venture discussed the question

TIN DREDGING AT TONGKAH HARBOR, PUKET, SIAM



General View of Dredge



Near View of Dredge, Showing Close-connected Type of Bucket Ladder

of abandoning the project, and it was probably the prompt action of a leading Melbourne investor, who has always been foremost in assisting the flotation of these Eastern ventures, that decided the question and retained the concession for Hobart.

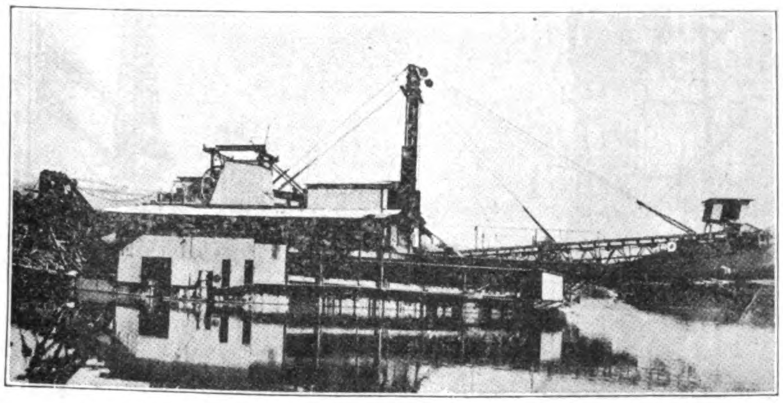
As showing the difference between the ambitious flotation schemes of to-day and those of 1906, we essayed to float the Tongkah Harbor Co., pay preliminary expenses, cost of flotation and re-registration, build a dredge, transport it to Penang, re-erect it there, tow it to Tongkah (180 miles), purchase fuel, provide dwellings for our men, dressing shed, floating plant, spares, etc., and pay salaries during the re-erecting period, with a paid-up capital of only £17,500, to provide which 35,000 shares were issued at 10s. In these days of extravagance this sum would be considered ridiculous, but the fact remains that all the work enumerated above was done and paid for out of £17,500. It is true, however, that during the opening-up period, and before getting down on tin, my bank balance was reduced to 30 dollars credit, while the outstanding liabilities amounted to £200, with nearly two-thirds of a month's wages due, and still no tin. At this stage a Chinese friend, resident in Tongkah, who was a comparatively large shareholder and knew the financial position of the company fairly well, interviewed me, and the following dialogue ensued: "You haven't much money, Capt. Miles?" "I think I have all I need." "Well, I don't think you have; and if you want 10 or 15 thousand dollars, send a chit (note) up to me, and I will send it down." "I have authority to do many things, but I don't think I have authority to borrow money." "No, I don't mean the company; I mean you. If you want the money I will send it to you." "But I might never be able to repay you." "Never mind that; if you can repay me you will; if not, I will forgive you." He left me after getting a promise that if I needed the money I would send for it. It was a kindly and generous offer of assistance from a friend who believed I needed it, in marked contrast with the usual offer of assistance when it is not needed. The assistance, however, was not required, for two days later we were down on tin, and at the end of the month had a nice little parcel in the store which cleared up all outstandings; but it was a close shave. If we had been compelled to make a call before getting down on tin, the Tongkah Harbor Co. would, in all probability, have gone into liquidation, and the dredging industry in the East would have been set back a quarter of a century.

No. 1 dredge was built in Glasgow, transported to Penang, and re-erected at the Prye Dock in 1907. Prince Dameong publicly started the machinery on November 4, 1907. Then came the problem of towing the dredge to Tongkah. No steamship company would undertake the responsibility, neither would any insurance company take the risk. It was the generally expressed opinion of the Europeans that the dredge would never reach Tongkah. One could understand the Chinese and native population, who had never seen or probably heard of such a piece of machinery as a dredge, being sceptical, but the insistence with which the European section of the community opposed everything connected with the dredge and dredging is incredible. It may have been from ignorance, or, more probably, from jealousy of a stranger coming there and supplanting them in an industry which they regarded as their own. The only choice left me was to hire a small steamer, with a native crew, capable, in fine weather, of towing the dredge three miles an hour. The dredge went uninsured, and I had to guarantee the owners of the steamer her full value in case of loss. My son took charge of the dredge and those on board, and I navigated the steamer. For the first twelve hours we had a rough time with a nasty troublesome beam sea; after that we got inside of a chain of islands skirting the coast, and fared better. On the third might, about 10 p.m., we anchored in Tongkah harbor, having had little food or sleep for three days. We only got the anchor down just in time, for within two hours a gale sprang up from the westward, and blew with hurricane violence for several days. Had it caught us crossing the open sea, anything might have happened; to run back to the islands for shelter would have involved turning round broadside to wind and sea, which, with her top hammer, would have been most dangerous. However, the Miles luck prevailed; we got there without accident, and without insurance. Two days later we were dredging Tongkah harbor.

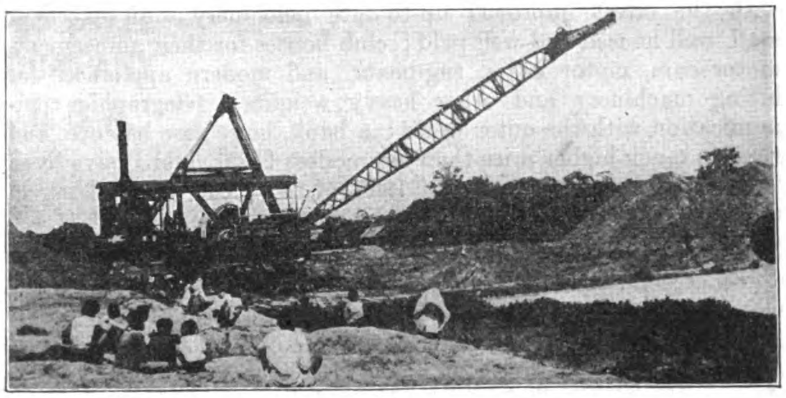
The early dredging difficulties were stupendous. There were many things we needed, but, being short of capital, had to wait for them until we could dig them out of the ground. Tongkah at that time had no telegraphic communication, and was served by a small steamer from Penang weekly; there was no engineering shop of any description; even a 3-in. bolt had to come from Penang; the smallest casting took 10 or 12 days, and frequently longer, to reach Tongkah. To get fresh water for boilers we had to tow a punt up the creek on flood tide, wait until the stream was fresh at low water, fill the punt with buckets, and wait again for the next high water to float the punt and tow her down on the ebb. Thus it took two days to get a punt load of water to the dredge. Fuel was another trouble; the natives had been in the habit of cutting wood a certain size and selling it at so much per 100 pieces, and it was with the greatest difficulty that I could persuade them to cut wood suitable for the dredge. Then came the transport. We had nothing but small open sampans to carry 15 to 20 tons of firewood daily to the dredge, and this work occupied the whole 24 hours. On more than one occasion, to prevent the dredge stopping, my sons and I had to turn out at night, load up a couple of sampans, and take them out to the dredge; no other labor was available, and it was a case of stopping the dredge or carting the wood.

The labor troubles were immense. The natives were afraid of the machinery, afraid of working in the dark, afraid of European employers, who had the reputation of treating them badly, and at

BUCYRUS DREDGES IN SIAM AND F.M.S.



7 cu. ft. Dredge for Tin Bentong, No Liability, Melbourne now at work in Federated Malay States



Class 175-B one of the three Dragline Excavators Working on Large Irrigation System for Siamese Government

first positively refused to work on the dredge. By dint of persuasion, kindly treatment, and prompt payment, we got first one and then another, and finally a crew, who soon found that it was not a bad job; they were well paid, not ill-used, and had electric light at night to work by. Fortunately, we had no accidents. If one of them had been killed or seriously injured in the early stages, the dredge would have been doomed as "bad joss." After a time my trouble with the Asiatic employees ceased, and the source of trouble then was the Europeans, some of whom would persist in bullying and ill-treating the Asiatics, and finally I was compelled to insist upon the natives being treated as human beings and not as brutes. On more than one occasion I was obliged to get rid of an otherwise good European because of his treatment of the Asiatic. Under Asiatic custom, all the members obey the head of the family, be he grandfather, father, or elder brother, and so with the head man of the village or the head man of a *kongsi*. Under their custom, while it was quite proper for me, as *towkay* of the dredging company, to chastise them if they did wrong, if was improper for any of my subordinates to do so. They will accept chastisement from the head man without a murmur, but resent it coming from anyone else.

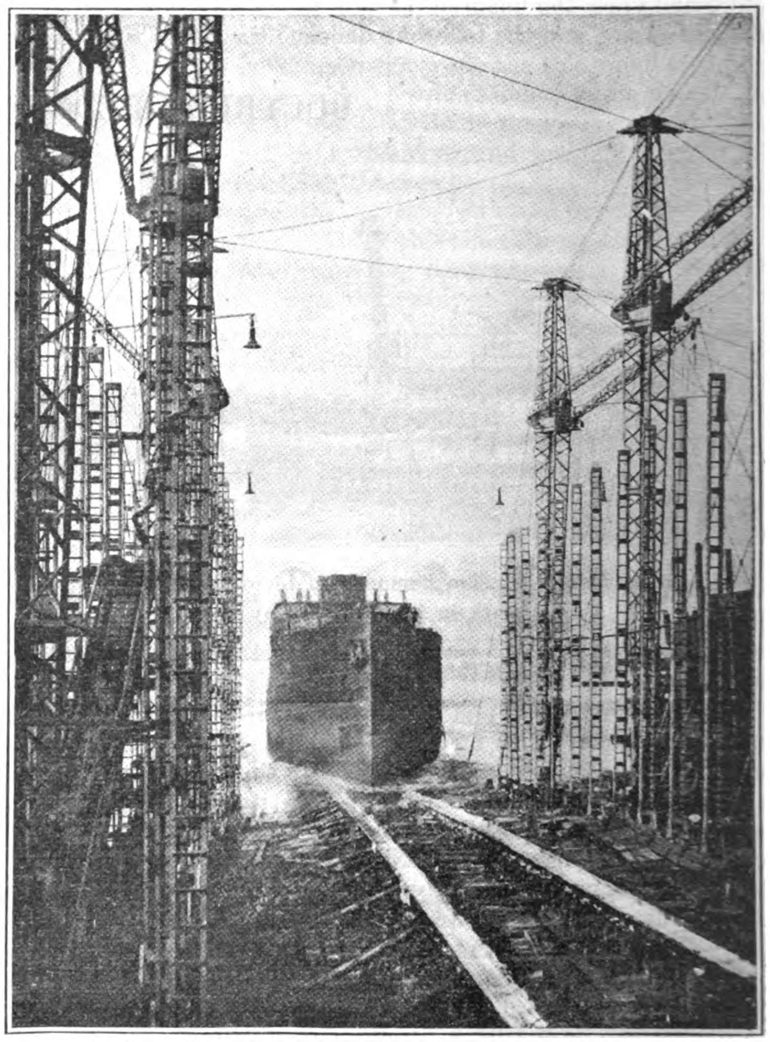
One could go on enumerating the difficulties of the early pioneers, which time and circumstance have much changed. In Tongkah now, the manager has quite an imposing residence in the healthiest locality. I lived in a Chinese-built house in which there had been several cases of plague. They have a first-class workshop, with the latest improved up-to-date machinery; an excellent staff, well housed and well paid; club-houses for their amusement, motor cars, motor boats, tug-boats, and modern appliances for lifting machinery and other heavy weights; telegraphic communication with the outer world; a bank, large case balance, and tin at a much higher price than my modest £125; and I have lived to see my optimistic dream of 1905, of the future of dredging in the East, fully realized.

But there is cause for concern in the high capitalization and ever-increasing operating costs of present-day companies, and if the pioneers had been imbued with the extravagant ideas of some latter-day-promoters, there might have been no Tongkah Harbor Co., and probably no tin-dredging in the East to-day. But dredging is there to stay until all the workable dredging ground is exhausted. There is little 2-lb. ground left, and not a great deal of ground worth 1-lb. The dredging of the future will be chiefly in ground of under a pound per cubic yard value, and hence after the war it will be necessary to exercise economy in every direction to enable shareholders to get a fair return for their investments.

But it is so much easier to increase than to reduce expenditure; and I fear the enormous earning power of the companies during the war may have created extravagant habits that will be difficult to shake off. Take the item of labor as an illustration. The coolies of 1905 considered himself well paid at 60 cents per day; increases have been periodically made until the best of them to-day get $2. A Chinese mechanic in 1905 was paid $1.50; the rivalry and competition between the companies for mechanics accustomed to dredge work is now so keen that these men are offered inducements to go from one company to another, each time at increased rates, until they now get from $4 to $5 per day; and so with Europeans. It is quite a common occurrence to find a man whose passage has been paid from Australia or England on a three years' contract, after a few months' or a year's service, working for another company, which did not provide his passage, at much higher rate. In addition to the increased wages, the numbers have increased to such an extent that there are now employed on and about a dredge 50 per cent. more men than was originally considered sufficient to do the work. It will be difficult to alter these working conditions, and the economical dredging of low-grade ground in the future would appear to lie in the direction of improvements in the machinery to enable more ground to be treated per month with the same number of hands. If this can be done, dredging low-grade ground may survive an ugly reverse in the market; if not, many thousands of tons of tin will remain in the ground.

Yarrow Launchings

THE steamer *Aabenraa* built for the Nordosterso Rederiet of Copenhagen was launched from Yarrow & Company's yard at Scotstoun, near Glasgow, on August 31st. She is a single deck steamer with forecastle, long bridge and poop. The length is 286-ft., beam 43-ft. 6-in., and depth 21-ft., the gross tonnage is 2,211 and the deadweight carrying capacity 3,500 tons on 19-ft. draft. There are three holds with four exceptionally large hatches (24-ft. by 20-ft.), one 10-ton derrick, five 3-ton derricks and six winches. The machinery consists of triple-expansion engines 20½-in., 33-in., and 54-in. diameter with a stroke of 36-in., and two boilers 13-ft. 6-in. diameter by 10-ft. 6-in. long for a working pressure of 180-lbs. per square inch, fitted with superheaters. The machinery has been constructed by Yarrow & Co., Ltd., and is now being fitted on board. On September 29th, the steamer *Essonite* built and engined to the order of Mr. Wm. Robertson of Glasgow, was also launched.



Launching of the "Aabenraa" at Yarrow's Yard

The *Essonite* is a "well-deck" vessel, having forecastle with long raised quarter deck and bridge combined, the machinery being placed aft. The deadweight capacity is 800 tons on a draft of 13-ft. 6-in. The length is 175-ft. between perpendiculars, breadth 28-ft. and depth 13-ft. 6-in. There are two hatches each served by a derrick and a 3-ton winch. Triple-expansion engines $\frac{15\text{-in., } 25\frac{1}{2}\text{-in. and } 14\text{-in.}}{30\text{-in.}}$ derive steam from two boilers 11-ft. diameter by 10-ft. long, designed for a working pressure of 180-lbs. per square inch. The vessel will steam at about 10 knots, has been constructed to class Lloyd's 100 A1 and is fitted with electric light throughout.

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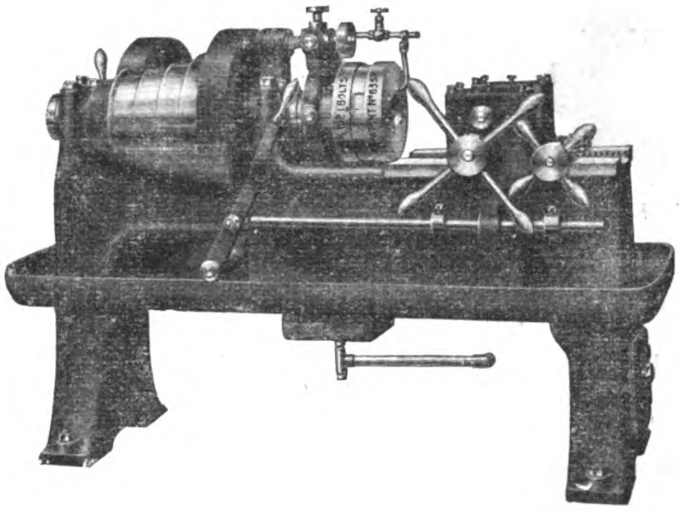

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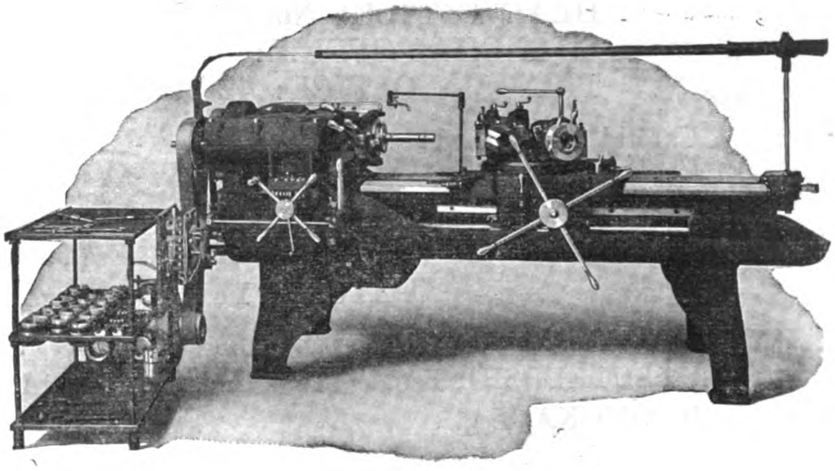

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GUADELOUPE—Pointe-à-Pitre and Basse Terre.

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BRITISH GUIANA—Georgetown, New Amsterdam, &c.

BRITISH HONDURAS—Belize.

CAPITAL PAID UP & RESERVES $41,000,000 GOLD
RESOURCES - - - $530,000,000 GOLD

THE BANK OF TAIWAN LTD.

INCORPORATED BY SPECIAL IMPERIAL CHARTER, 1899

Capital Subscribed - - - - - - -	Yen 60,000,000
Capital Paid-up - - - - - - - -	„ 45,000,000
Reserve Funds - - - - - - - -	„ 9,680,000

President: KOJURO NAKAGAWA, Esq. Vice-President: SHUNROKURO MORI, Esq.

DIRECTORS:

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GUNJI KAWASAKI, Esq.
TADASU HISAMUNE, Esq.
KUMEMATSU MORINAGA, Esq.
MASUMI ESAKI, Esq.

Head Office: TAIPEH, FORMOSA (TAIWAN)

BRANCHES:

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TAIWAN: Keelung, Tainan, Takow, and 11 other points.
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Telegraphic Address: "TAIWANGINK."

Phone Nos. 1060, 1061, 1062, 1063, 1064, 1065, 1066, 446, 447, 448 and 449, Marunouchi.

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Special facilities are available for exchange business on China, Straits Settlements, East Indies, Australia, Great Britain, Russia, America, Canada, South Africa, etc.

Industrial Bank of Japan, Limited

(NIPPON KOGYO GINKO)

Incorporated by Special Charter in 1902 to Encourage Foreign Investments

CAPITAL SUBSCRIBED	Yen	50,000,000
CAPITAL PAID-UP	Yen	45,000,000

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MARUNOUCHI, TOKYO. CABLES "KOGIN," TOKYO

BRANCHES:

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OSAKA: KORAIBASHI
KOBE: NAKAMACHI

H. HIJIKATA, Esq., President
Y. ONO, Esq., Vice-President
K. IYANAGA, Esq., Director
T. IWASA, Esq., Director
KOZO MATSUMOTO, Esq.

AUDITORS:

NAGATANE SOMA, Esq.
KINTARO HATTORI, Esq.
KINICHI KAWAKAMI, Esq.
TAICHI OHBA, Esq.

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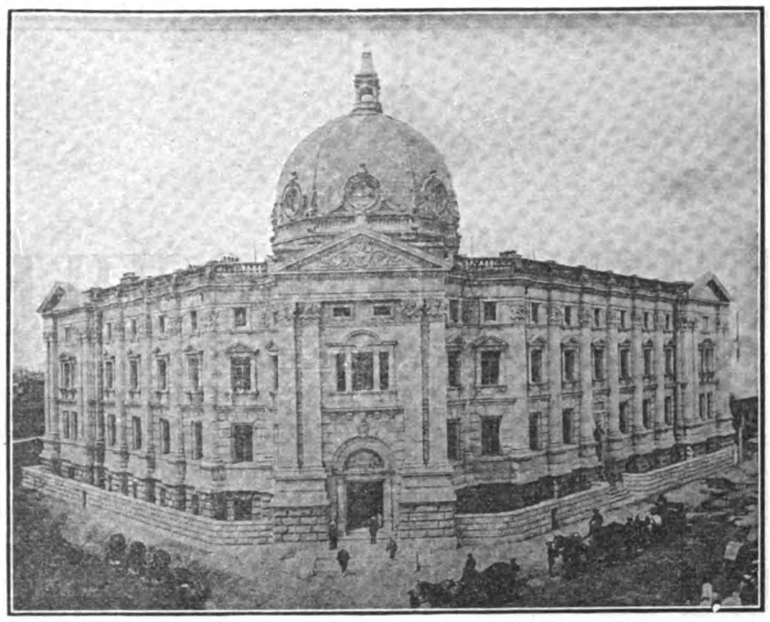
2.—Subscription and underwriting public bonds or debentures.
3.—Deposits and safe custody of valuables.
4.—Trust company business.
5.—Discounting of bills.
6.—Foreign exchange business.
7.—Other banking business sanctioned by the Minister of State for Finance in accordance with Law of Ordinance.



HEAD OFFICE, YOKOHAMA

Capital (Fully Paid-Up):
Yen 100,000,000

Reserve Fund:
Yen 57,000,000

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Established 1880

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TARO HODSUMI, Esq.

Head Office: YOKOHAMA
Manager: H. MORI, Esq.

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Manager: K. MOGAMI, Esq.

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Fertilizer Works	Niihama
Sales Departments	Osaka, Kobe, Tokyo, Kure, Yokosuka, Hakata, Shanghai, Hankow and Tientsin

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Head Office: OSAKA, JAPAN

Cable Address: "SUMITBANK"

President: Baron K. SUMITOMO

Established March, 1912

(Successors to The SUMITOMO BANK)

Capital Subscribed	Yen 70,000,000	Reserve Fund	Yen 20,200,000
Capital Paid-up	„ 40,000,000	Deposits	„ 38,100,000

(as on 20th July, 1921)

Head Office: Kitahama, Osaka

City Offices: Semba, Bingomachi, Nakanoshima, Dotonbori, Kawaguchi, Tenma, Nipponbashi.

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The Bank buys, sells and receive for collection Drafts and Telegraphic Transfers, issues Commercial and Travellers Letters of Credit available in all important parts of the world, besides doing general Banking business.

THE

MITSUBISHI BANK, LIMITED

CAPITAL SUBSCRIBED	-	Yen 50,000,000
CAPITAL PAID-UP	- - -	Yen 30,000,000

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Baron Koyata Iwasaki

MANAGING DIRECTORS:

Mr. Manzo Kushida — Mr. Mikitaro Kikuchi
Mr. Kiyoshi Sejimo — Mr. Takeo Kato

HEAD OFFICE:

No. 1 Yayesucho Itchome, Kojimachi-ku,
Tokyo, Japan.

BRANCH OFFICES:

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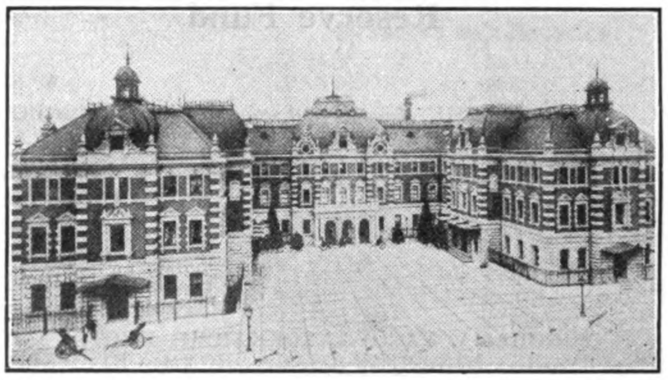

Capital Subscribed...	Y. 100,000,000.00
Capital Paid-Up......................	Y. 60,000,000.00
Reserve Fund (July 1921)......	Y. 28,000,000.00

HEAD OFFICE:

No. 1 Suruga-cho, Nihonbashi-ku,
TOKYO

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TOMITARO HARA, Esq., KANETARO KISHIMOTO, Esq., HIROKICHI KAMESHIMA, Esq. and KIKUSABURO FUKUI, Esq. (*Directors*).

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	The Chase National Bank.
	Bankers Trust Co.
Paris:	Banque de l'Union Parisienne.
	Comptoir National d'Escompte de Paris.
Bombay:	National Bank of India, Ltd.

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ESTABLISHED 1873

Subscribed Capital - - - Yen 50,000,000.00
Paid-Up Capital - - - - Yen 36,350,000.00
Reserve Fund - - - - Yen 29,500,000.00

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K. ISHII, *Managing Director*. Y. NOGUCHI, *Managing Director*. S. SUGITA, *Managing Director*.

HEAD OFFICE:
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T. AKASHI, *Manager*

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BRANCHES IN COREA:
SEOUL, FUSAN.

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New York: The National City Bank of New York.; The National Bank of Commerce in New York.; The Yokohama Specie Bank, Ltd.

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TOKYO

ESTABLISHED 1909

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R. SHIRAIWA, Esq., *Managing Director*

Subscribed Capital . . . . . . Yen 20,000,000
Paid-up Capital . . . . . . „ 11,500,000

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Hongkong and Shanghai Banking Corporation

Paid-up Capital	... ...	$15,000,000
Reserve Funds: Sterling	... ...	£2,500,000
Silver	... ...	$21,500,000
Reserve Liability of Proprietors	... ...	$15,500,000

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Deputy Chairman

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Hon. Mr. E. V. D. PARR
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H. P. WHITE, Esq.

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HONGKONG

Chief Manager:
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CANTON	PENANG
COLOMBO	RANGOON
FOOCHOW	SAIGON
HANKOW	S. FRANCISCO
HARBIN	SHANGHAI
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KOBE	TSINGTAO
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G. H. STITT, *Manager.*

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Vice-President:
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Managing-Directors:
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Directors:
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MARQUIS YORIMICHI TOKUGAWA
VISCOUNT YUKIYOSHI AOYAMA
HON. NAGAYUKI ASANO
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MASAO MATSUKATA, Esq.
KIYOSUMI TANIKAWA, Esq.

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BARON MICHITOMO IWAKURA
NAOYOSHI YAMAMOTO, Esq.
TAKAJI SEKIGUCHI, Esq.
TAKAYUKI IMAI, Esq.

Head Office Manager: **Kiyosumu Tanikawa, Esq.**

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Vice-President: JEN FUNG PAO

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CHEKIANG PROVINCE.—Hangchow, Ningpo.

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KIANGSI PROVINCE.—Kiukiang.

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SZECHUAN PROVINCE.—Chungking.

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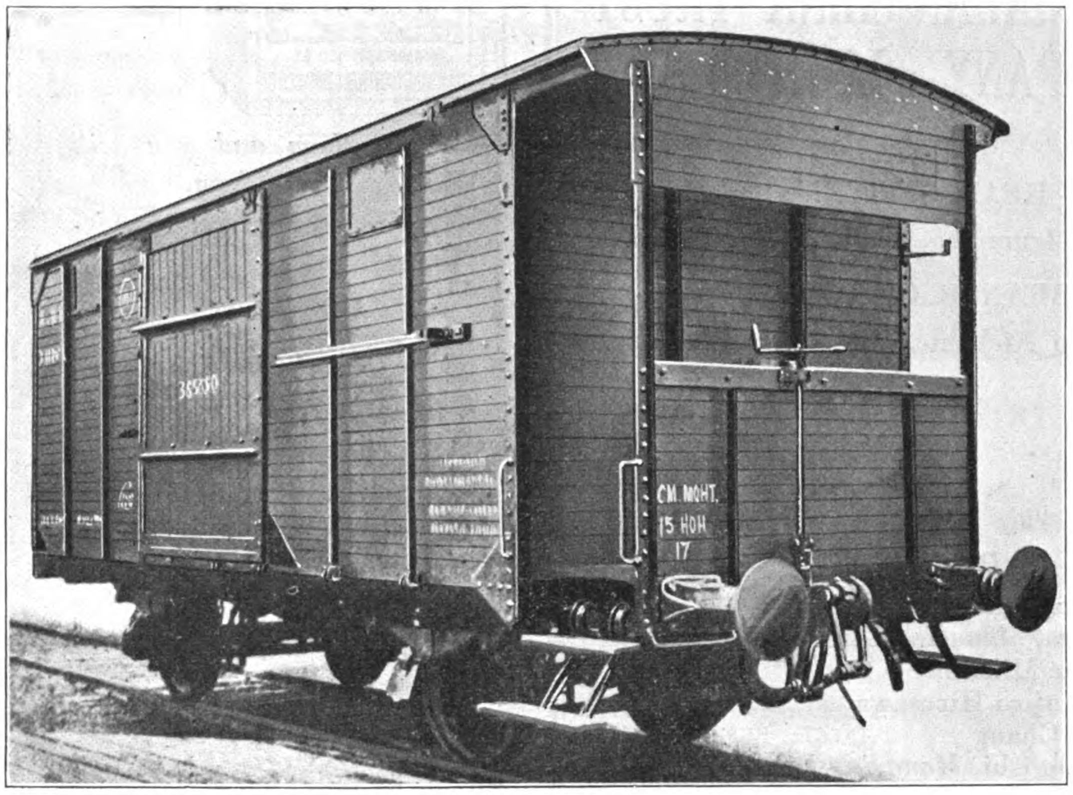

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Seiji Nawa, *Managing Director*
Toyotsune Mikami
Count Kinjiro Hirosawa
Wu Ting Chang
Kenji Imanishi, *Managing Director*
Taiji Arai
Seishichi Iwasaki
Saburosuke Fujisaki
F. N. Shea

Auditors:

Kanzo Matsuo, Standing
Toyohiko Kuki
Motosaburo Kaneko
Takayoshi Kondo

Councillors:

Raizo Kanda
Katsutaro Kamada

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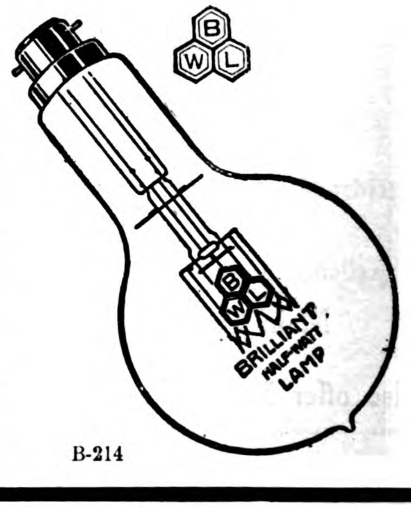

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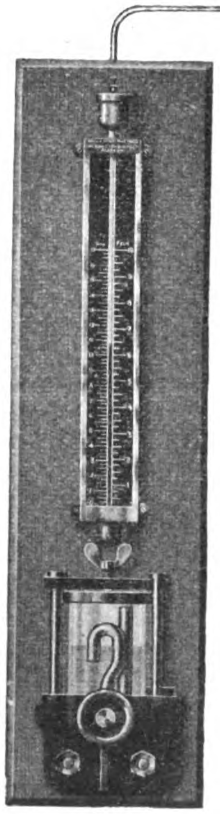

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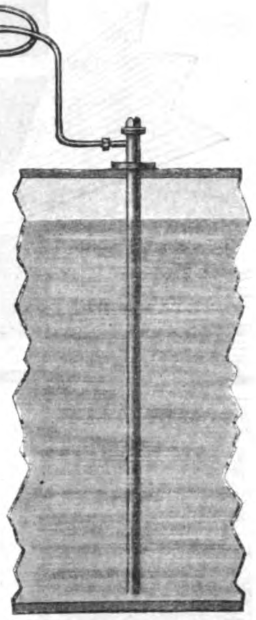

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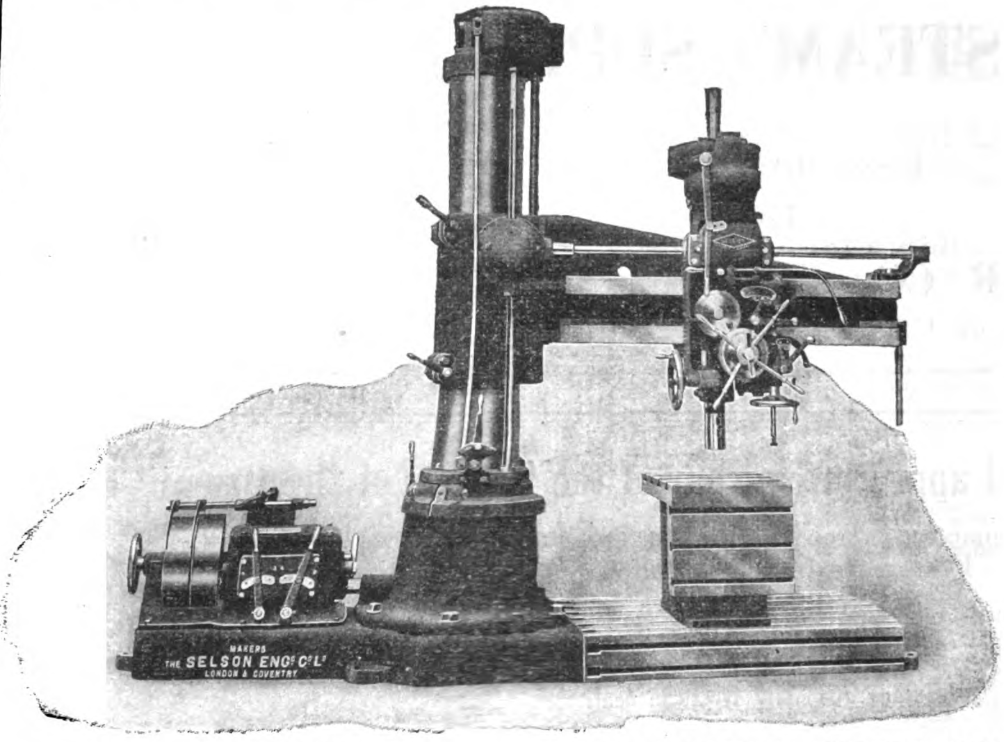

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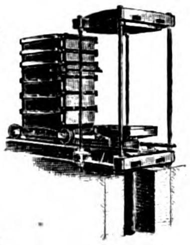

Hydraulic Packing Press, for Cotton Waste, etc.

for packing goods of every description, for Home and Foreign transport.

May we have your enquiries?

We make Presses and Pumps for Hand, Steam, and Electric Power.

EDWIN MILLS & SON LTD.

Wakefield Road,

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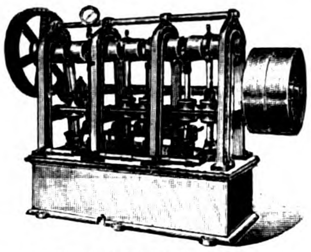
HUDDERSFIELD.



6 Throw Belt Driver Pump

Hydraulic Leathers, Pipes and Fittings always in stock.

DIVING APPARATUS

OF ALL PATTERNS IN USE TO-DAY

Contractors to . . .

BRITISH ADMIRALTY,
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Prompt shipment of complete sets and accessories of every description

Immediate Delivery

ALSO MAKERS OF

SMOKE HELMETS for Steamships, Oil Tankers, Oil Companies, Chemical Works, etc.

OXYGEN BREATHING APPARATUS For Rescue Work in Mines

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Oxygen Supplies of every description

Air Compressors Vacuum Pumps

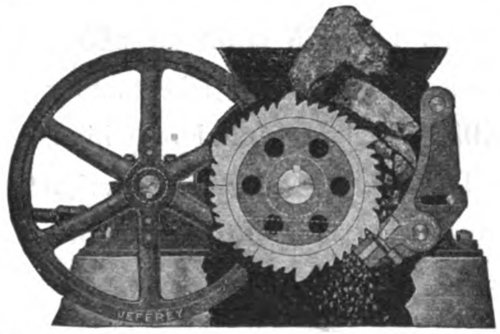
SIEBE, GORMAN & CO., LTD.

187 WESTMINSTER BRIDGE ROAD,
LONDON, ENGLAND

Agents for Japan and South China: MITSUI BUSSAN KAISHA

Cables: "SIEBE, LONDON."

Codes used: A.1, A.B.C. (5th Edition), Western Union, Engineering & Private



The Jeffrey Single Roll Crusher is built in four sizes with capacities from 20 to 300 tons per hour.

The Jeffrey Pivoted Bucket Carrier is especially adapted to large power plants. Built in six sizes with capacities from 30 to 160 tons.

Jeffrey Coal Crushing and Handling Equipment

Is an Important Link in the Generation of Cheap Power

The Jeffrey Single Roll Crusher in a Single Operation, Reduces Coal to Uniform Size for Maximum Heat Efficiency in Automatic Stokers.

Conveyers of the Pivoted Bucket, V-Bucket, Chain, Scraper, Belt, Steel Apron, Drag Chains and other types are adapted for the economical handling of coal and ashes in all sizes of power plants.

Write for latest Catalogs on our complete line of Coal and Ashes Handling Machinery.

The Jeffrey Mfg. Co., Columbus, Ohio, U. S. A.

JEFFREY

MATERIAL HANDLING MACHINERY

SOUTH MANCHURIA RAILWAY

MANCHURIA AND CHOSEN LINES

Circular and Overland Trips at Greatly Reduced Rates

TOURIST TRAVEL OFF THE BEATEN TRACK

Tourists in the Far East should not miss Manchuria. Through Japan, Chosen (Korea), and Manchuria (or vice versâ) is an ideal trip, combining the distinctive characteristics of three unique and profoundly interesting countries.

THE CHOSEN AND MANCHURIA LINES are under the management of the South Manchuria Railway Company. Express trains have been temporarily suspended (except between Fusan and Seoul and Dairen and Changchun), but the **ORDINARY TRAINS ARE EQUAL TO MOST AMERICAN TRAINS,** run at least twice a day from each end, and to some of them Sleeping and Dining Cars are attached. Sleeping berths should be reserved in advance.

HOTELS under the Company's management are established **ON FOREIGN LINES** at **SEOUL** (capital of Chosen), **FUSAN** and **SHINGISHU** (the two extremities of Chosen), **KONGOSAN** (the famous Diamond Mountain of Korea, rivalling Switzerland in scenery), **MUKDEN** (ancient capital of China, home of the Manchuria Dynasty, noted for Imperial Palaces and Tombs), **CHANGCHUN** (junction for three railways and "key to Manchuria"), **PORT ARTHUR** (of world-wide fame for its historic sieges and ruined forts), **DAIREN** (one of the greatest commercial cities in the Orient), and **HOSHIGAURA** (the finest seaside resort in North China).

FROM DAIREN there are **FREQUENT AND REGULAR STEAMERS** to and from Shanghai, Tsingtao, Tientsin, etc.

For pictorial guide-books, pamphlets, and further particulars, apply to the Tourist and Ticket Agencies, or direct to the

SOUTH MANCHURIA RAILWAY COMPANY

Head Office: DAIREN

Branch Offices: TOKYO, SEOUL, HARBIN, KIRIN, PEKING, SHANGHAI AND NEW YORK.

Telegraphic Address: MANTETSU or SMRCO. Codes: A.B.C. 5th & 6th Editions, A1 Lieber's, and Bentley's

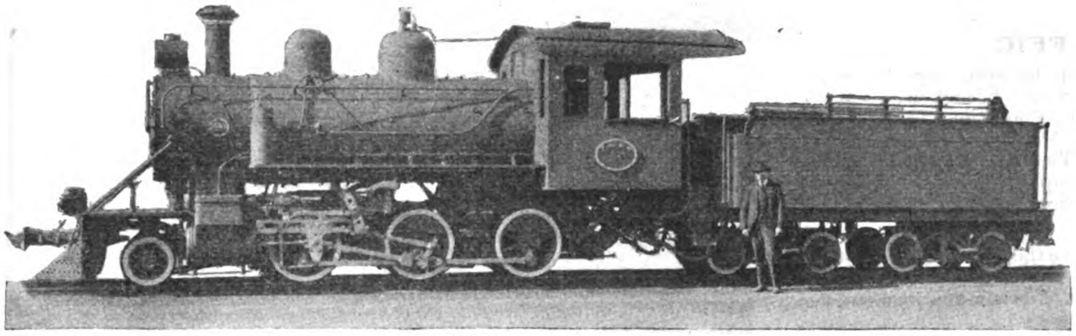
BALDWIN

New Power in Southern Asia

Passenger, Freight and Shunting Locomotives Operated on the Federated Malay States Railway

Due to the excellent service rendered by the twelve Pacific type locomotives built in 1919, and the assurance of prompt delivery, the Federated Malay States Railways on October 4, 1921, ordered ten Baldwin Mogul type locomotives for mixed passenger and freight service and ten six-coupled side-tank locomotives for shunting service.

These twenty locomotives, embodying Baldwin shop practice and A. S. T. M. material specifications were shipped direct from our Eddystone works to Port Swettenham, on April 16, 1921, and are now being placed in operation.



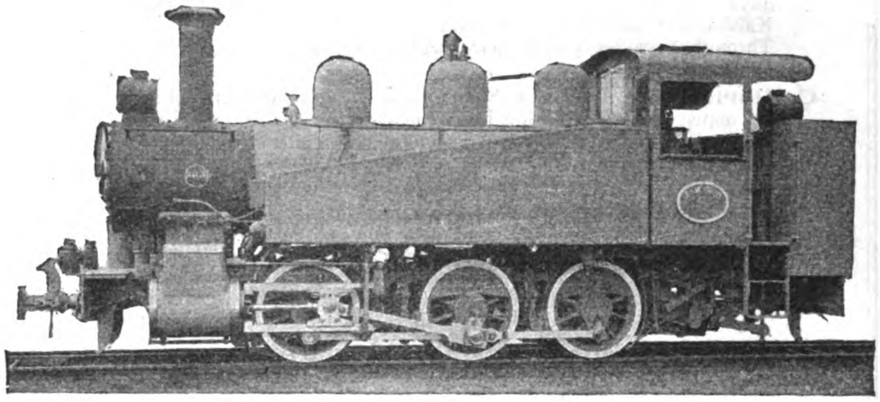
Gauge 3' 3⅜". Cylinders, 14 by 18".

Diameter, drivers, 37". Working pressure, 160 pounds.

Weight on drivers, 52,000 pounds.

Total weight, engine and tender, 109,000 pounds.

Fuel, coal and wood.



Gauge 3' 3⅜" Cylinders, 16 by 20".
Diameter, drivers, 42". Working pressure, 160 pounds.
Total weight, 78,000 pounds.
Fuel, coal and wood.

Baldwin Locomotives represent in all types the Standard of Excellence.

Our nearest representative will furnish any information or assistance desired.

Shanghai: Andersen, Meyer & Co., Ltd.
Tokyo: Sale & Frazar, Ltd.
Harbin: J. W. Kelker

Calcutta: F. T. Slayton
London: R. P. C. Sanderson
Bandoeng: J. O. Feenstra

THE BALDWIN LOCOMOTIVE WORKS

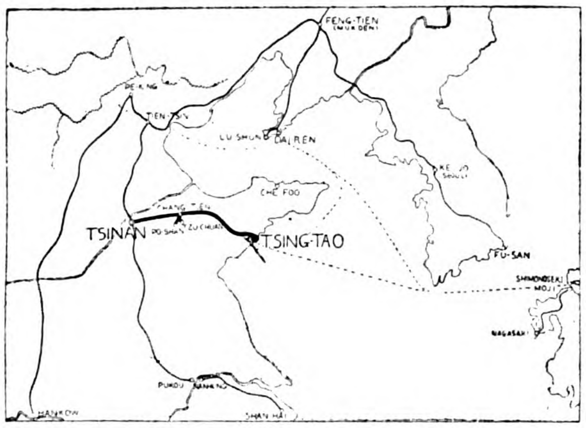
PHILADELPHIA, U.S.A.

Cable Address : "Baldwin, Philadelphia"

LOCOMOTIVES

SHANTUNG RAILWAY

The Shortest Route between Japan and North China



THROUGH TRAFFIC

Through passenger tickets are issued between the following principal stations of the Shantung Railway: Kiaochow, Kaomi, Fangtsu, Weihsien, Chingchow, Changtien, Choustun, Tsinan, Tzuchuan, Poshan, and the following points: In Manchuria—Port Arthur, Newchwang, Liaoyang, Fushun, Mukden, Tiehling, Kaiyuan, Changchun, Penchihu, Antung, and Dairen; in Japan—Tokyo, Yokohama, Nagoya, Kyoto, Osaka, Kobe, Ujina, Moji, Shimonoseki, Nagasaki and Shanghai.

Steamer Connections—Steamers leave the wharves of the Large Harbour, Tsingtao, for Moji and Kobe every five days, for Shanghai about twice a week and for Dairen about three times a week.
For giving facilities to through passengers for Japan, a special train in connection with the night train No. 4 is operated from the Harbour Station to the Wharf, direct alongside the ship, on those days when the liners of the Nippon Yusen Kaisha, Osaka Shosen Kaisha, and Harada S.S. Co. are leaving.
Through passengers and their luggage are carried free of charge for this section.

Collieries—The Tzuchuan (Shisen) and Fangtzu (Boshi) Collieries are managed by the Mining Department of the Shantung Railway.
At present the daily output of Tzuchuan coal is about 1,500 tons, far surpassing the amount taken out when the Germans were in control. The coal is well-known for its good quality and fair price.

Tsinan—Tsinan, the capital of Shantung, is the western terminus of the Shantung Railway, and also one of the most important stations on the Tientsin-Pukow Railway.
The Tsinan Railway Hotel, furnished in modern European style, is found on the upper floor of the Tsinan Station, under the control of the Shantung Railway Administration.

THROUGH TRAIN SERVICE

Train No. 1 leaves Tsingtao daily 8.00 a.m. arrives Tsinan 6.30 p.m.
Train No. 3 leaves Tsingtao daily 9.30 p.m. arrives Tsinan 8.30 a.m.
Train No. 2 leaves Tsinan daily 8.00 a.m. arrives Tsingtao 6.30 p.m.
Train No. 4 leaves Tsinan daily 11.00 p.m. arrives Tsingtao 9.30 a.m.

Local Trains run between Tsingtao and Kaomi, Weihsien and between Fangtzu and Tsinan, and on the Poshan and Tzuchuan colliery branches.

Fares—Tsingtao-Tsinan—1st class, $14.30 ; 2nd class, $7.20.

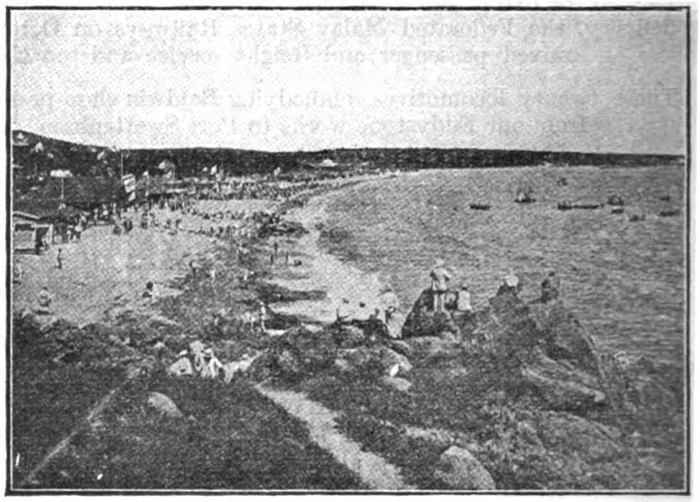
First Class Sleeping Car—A first-class sleeping car is attached to night trains Nos. 3 and 4 running between Tsingtao and Tsinan. For a berth in the sleeping car in S.Y. 3.00 for the lower berth and S.Y. 2.00 for the upper berth is charged in addition to the ordinary first-class fare, irrespective of distance.

Dining Car—A dining car is attached to through trains Nos. 1, 2, 3 and 4 running between Tsingtao and Tsinan. Meals are served to order at any time.

Ticket Agencies—Messrs. Thos. Cook & Son and their branch offices in various parts of the world. The Japan Tourist Bureau in Tokyo and their Agents in Yokohama, Kobe, Nagasaki and Peking.

Connections at Tsingtao—By steamer with Japan, Manchuria and Shanghai.

Connections at Tsinan—By Tientsin-Pukow Line with Tientsin, 6.00 & 9.38 a.m. daily, and with Pukow, 7.44 a.m. & 10.21 p.m. daily.



BATHING BEACH, TSINGTAO.

Description of Tsingtao

Tsingtao is considered the most healthful place in all the Far East. The scenery including both mountains and sea, is most beautiful. There are quite extensive forest gardens, bits of woodland here and there, and many delightful shady lanes affording most interesting walks through them.
The roads are all broad, with very moderate gradients. They are of both macadamized and asphalt construction for vehicle traffic, while the sidewalks are either paved or concrete. These streets are practically all lined with beautiful shade trees.
The buildings are constructed principally in modern European style, with red tiles and white walls, contrasting pleasantly with the surrounding green mountains and blue sea.
The climate here is fine from Spring to Autumn, being neither too hot nor too cold. These climatic conditions make the place a favourite summer resort for Europeans and Americans from Shanghai, Tientsin, and other places.
The hotels are luxuriously furnished with up-to-date equipment and are under the efficient management of Mr. H. J. Hearne.
The hotel rates are $6.00 and up, per day, on the American plan.

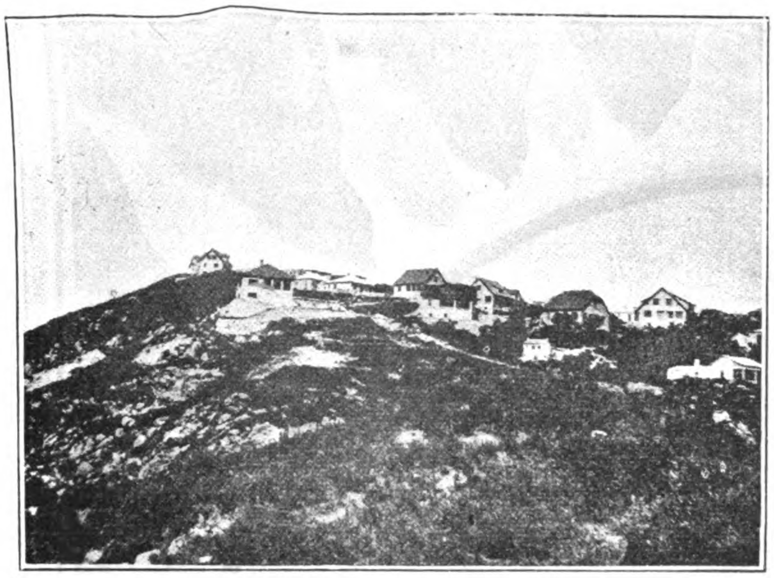
THE GREAT HARBOUR, TSINGTAO

For Further Information, please apply to

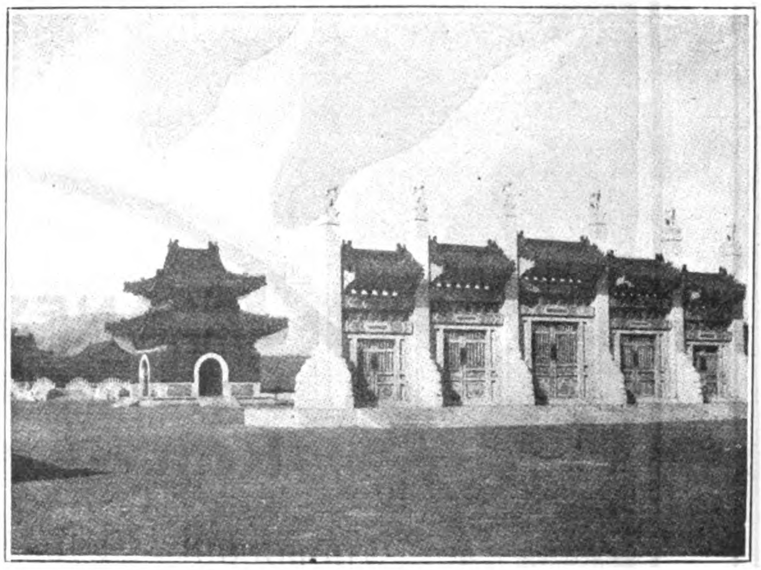
THE SHANTUNG RAILWAY ADMINISTRATION, TSINGTAO

CABLE ADDRESS: "SANTETSU" CODES: A.B.C. 5TH ED. & AI.

CHINESE GOVERNMENT RAILWAYS



SUMMER RESORT AT CHI KUNG SHAN



AT THE CHUNG LING TOMBS

PEKING-HANKOW LINE

"The Road Through The Heart of China"

THE Peking-Hankow Line, the most important section of China's overland route, enables tourists and travellers to get a glimpse of Old China, the train passing through magnificent scenery, traversing the great plains of Chihli, the central portion of Honan and the mountainous regions of the eastern Hupeh province.

The Peking-Hankow route joins at Fengtai the main line of the Peking-Mukden Railway, by means of which this line is connected with the railways in Manchuria, Korea, Japan, and Siberia, while steamer facilities at Hankow bring it into easy communications with the Yangtze River ports and Shanghai.

From the Capital to Hankow the journey occupies 34 hours, by the daily through train which is provided with up-to-date sleeping and dining accommodations.

In the future, this line will connect by means of a ferry-boat the Hankow-Canton Railway whose completion will bring the Capital of China, and Hankow, the Great Central Market, within easy distance of Canton the southeastern metropolie.

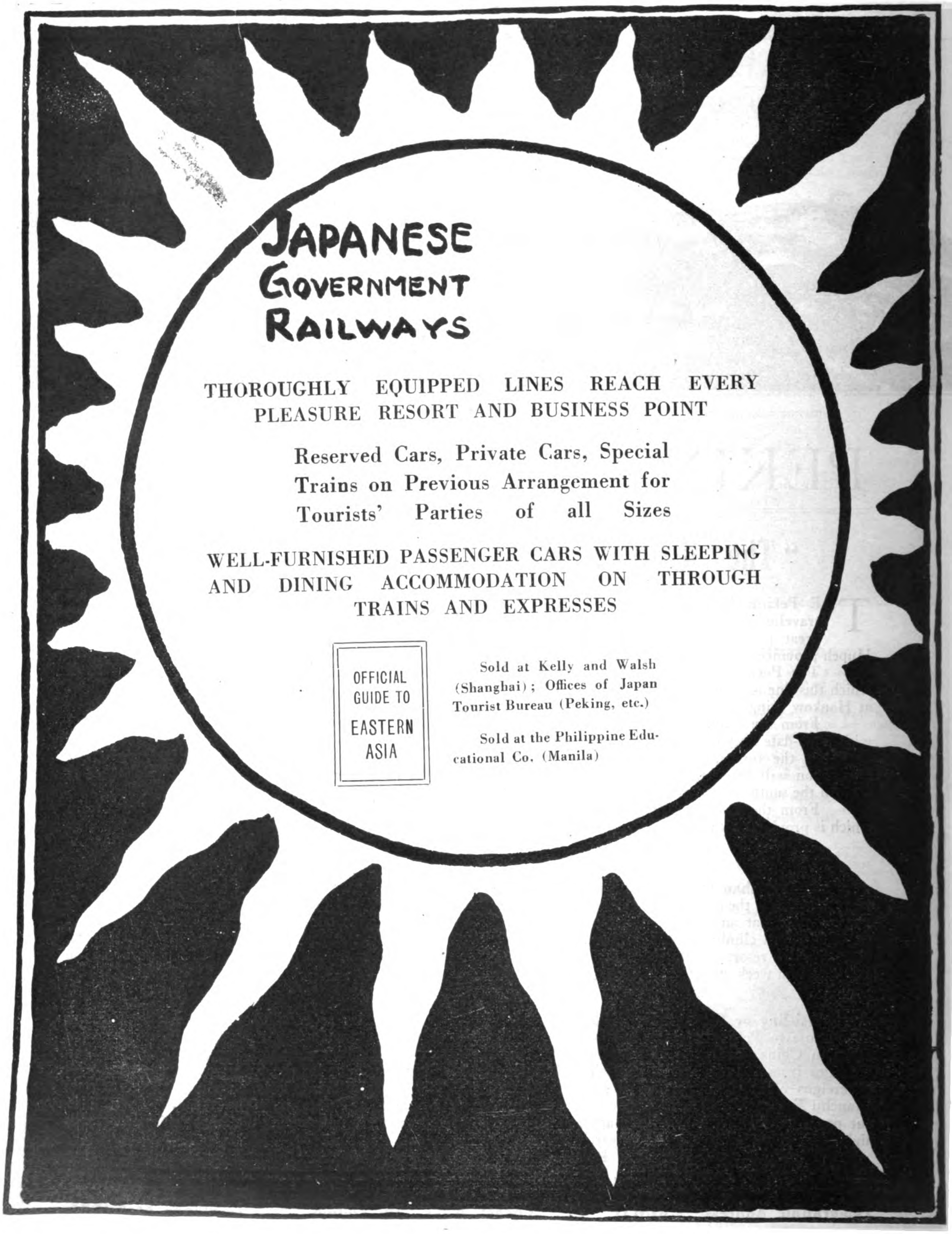
From the Capital to Hankow the journey about 30 hours by the bi-weekly "Express" through train which is provided with up-to-date sleeping and dining accommodations.

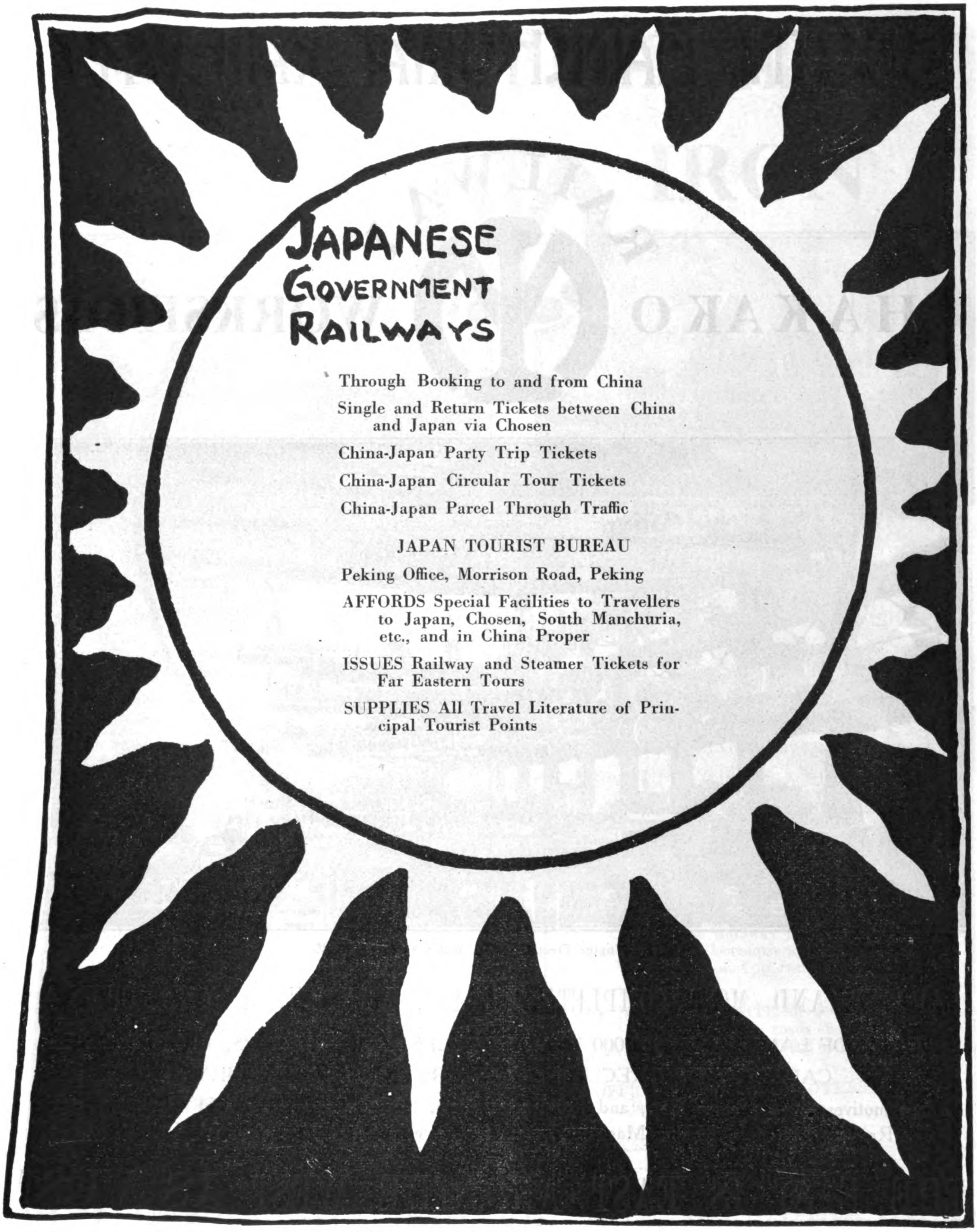
Chikungshan Mountain (Summer Resort).—Not many Summer Resorts in China inland, can bear comparison with the natural charming views, that reward those who ascend the mountain of Chikungshan, whose summit stands at an altitude of 1,980 ft. On reaching Sintien station, situated 110 miles from Hankow, a serpentine road climbs the mountain, on top of which are hundreds of beautiful bungalows awaiting vacationists. This popular resort is celebrated for its scenery, where an almost unbroken communion with nature can be enjoyed for a week at a time.

Hsi-ling or Western Imperial Tombs.—With their present-day accessibility, there is now little excuse for visitors to Peking omitting a trip to the Western Imperial Tombs, undoubtedly one of the most impressive sights in China. The site of these beautifully adorned Imperial Tombs is close to Liang Ko Chwang station, 79 miles from Peking, which is reached by a Branch-line, formerly built for the exclusive use of the Imperial Sovereigns when visiting the Tombs of their ancestors. The Western Tombs include the mausoleums of four Manchu Emperors and three Empresses, as well as those of a number of Princesses. The region, as a well laid-out park, closely wooded, is justly appreciated for the charming scenery surrounding the Imperial Tombs and is highly recommended to any one in search of the extraordinary and beautiful.

For Particulars, Pamphlets, Reservations, Tickets, etc., apply to the "Information Bureau" at Peking Head Office or to Tourist Agencies.

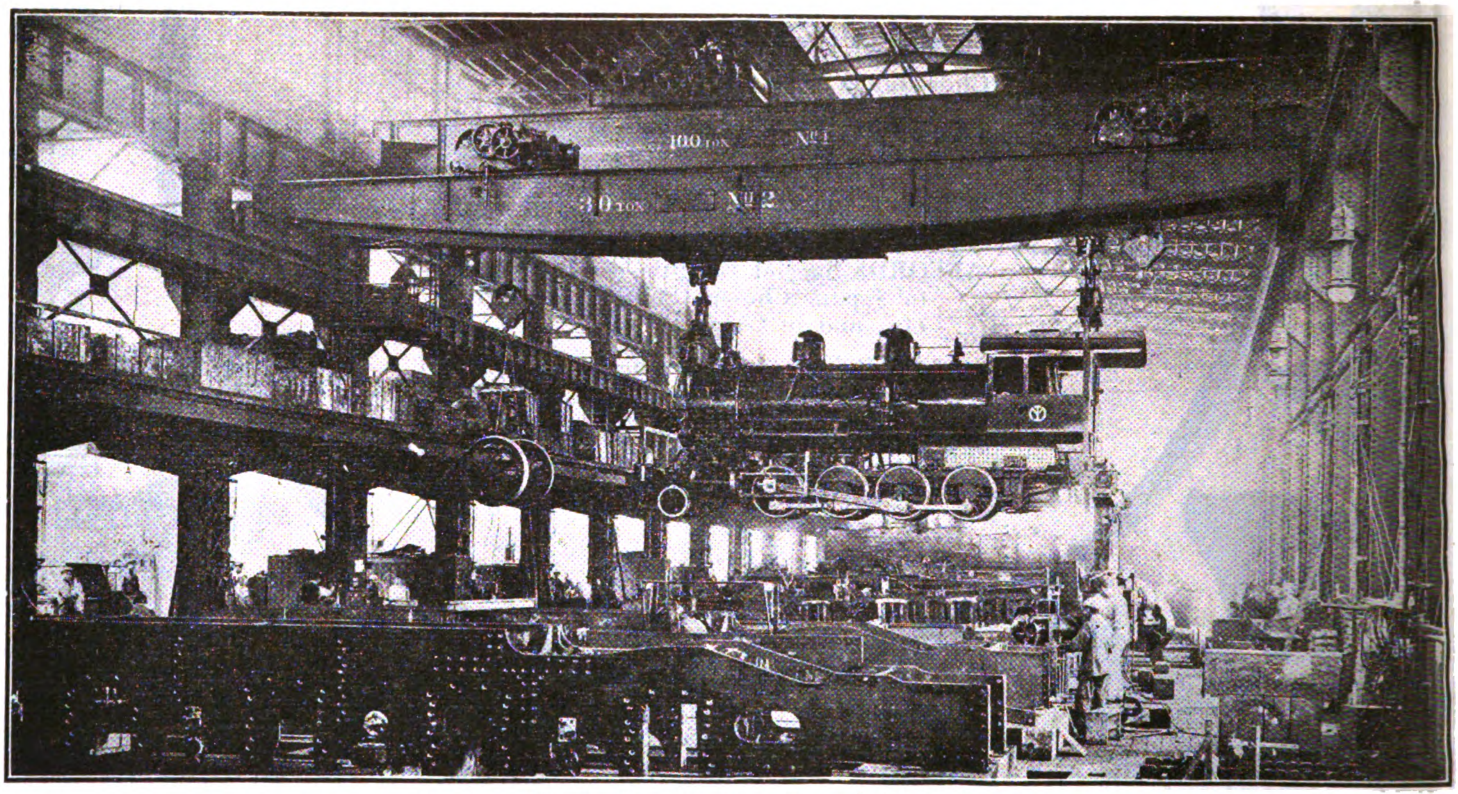
Telegraphic Address: "KINCO" **Codes: A.B.C. 5th Edition** **Telephone East 1698**


JAPANESE
GOVERNMENT
RAILWAYS
THOROUGHLY EQUIPPED LINES REACH EVERY PLEASURE RESORT AND BUSINESS POINT
Reserved Cars, Private Cars, Special Trains on Previous Arrangement for Tourists' Parties of all Sizes
WELL-FURNISHED PASSENGER CARS WITH SLEEPING AND DINING ACCOMMODATION ON THROUGH TRAINS AND EXPRESSES
OFFICIAL GUIDE TO EASTERN ASIA
Sold at Kelly and Walsh (Shanghai); Offices of Japan Tourist Bureau (Peking, etc.)
Sold at the Philippine Educational Co. (Manila)


JAPANESE
GOVERNMENT
RAILWAYS
Through Booking to and from China
Single and Return Tickets between China and Japan via Chosen
China-Japan Party Trip Tickets
China-Japan Circular Tour Tickets
China-Japan Parcel Through Traffic
JAPAN TOURIST BUREAU
Peking Office, Morrison Road, Peking
AFFORDS Special Facilities to Travellers to Japan, Chosen, South Manchuria, etc., and in China Proper
ISSUES Railway and Steamer Tickets for Far Eastern Tours
SUPPLIES All Travel Literature of Principal Tourist Points

SOUTH MANCHURIA RAILWAY

SHAKAKO RAILWAY WORKSHOPS



Interior of Engine Erecting Shop, Shakako Shops, S.M.R.

LARGEST AND MOST COMPLETE IN ALL MANCHURIA AND CHINA

AREA OF LAND: About 300,000 Tsubo. OFFICES & WORKSHOPS, 14,000 Tsubo

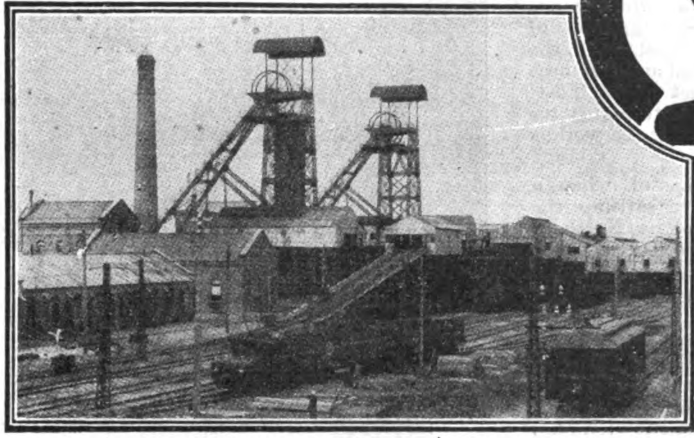
CAPACITY OF EXECUTING REPAIRS SIMULTANEOUSLY:

27 Locomotives, 36 Passenger Cars, and 130 Freight Cars, besides Constructing and Repairing other Railway Materials, Mining Machinery, etc. Employees: 5,000 Japanese and Chinese.

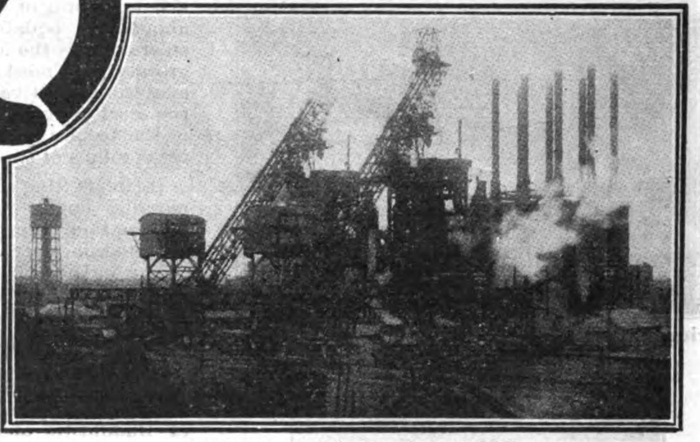
THE EAST IS EAST AND THE WEST IS WEST

SOUTH MANCHURIA RAILWAY

COAL IRON



Togo Pit of the S.M.R. Fushun Collieries



Anshan Steel Works of the S.M.R.

FUSHUN COAL

The Best Steaming Coal in the Far East | Fresh Stocks Always on Hand

Depots:

Dairen	Port Arthur	Newchwang
(Yingkou)	Tientsin	Tsingtao

Agencies:

Chefoo	Takao (Formosa)	Osaka
Manila		Nagoya
Hongkong	Batavia	Shanghai
Sourabaya	Yokohama	Moji
Singapore	South Seas	Saigon
Penang	Niigata	etc.

Also Sulphate of Ammonia, Fire Clay, and Talc

Pamphlets and Particulars gratis from any of the above Depôts and Agencies, and from the

MINING DEPARTMENT,

South Manchuria Railway Company, Dairen

ANZAN IRON & STEEL WORKS

New Enterprise Set Up Like Magic Amidst the Wilderness of Manchuria.

TRACT OF LAND: about 4,000,000 tsubo.

BLAST FURNACE No. 1 (with a capacity for about 350 tons per day) Opened to service on April 29, 1919.

BLAST FURNACE No. 2 (with a capacity for about 350 tons per day) Made ready for service on February 24, 1920.

MEANS OF TRANSPORTATION in the plant: 24 miles of railway and 2.5 miles of electric tramway in operation, with three light locomotives and a number of slag-, coke, and ore-cars of from 8 to 24 tons.

A NEW TOWN SITE of 400,000 tsubo, with the necessary roads and water and sewage services, laid out and rented to lessees.

OFFICIALS AND EMPLOYEES: 2,300 Japanese and Chinese.

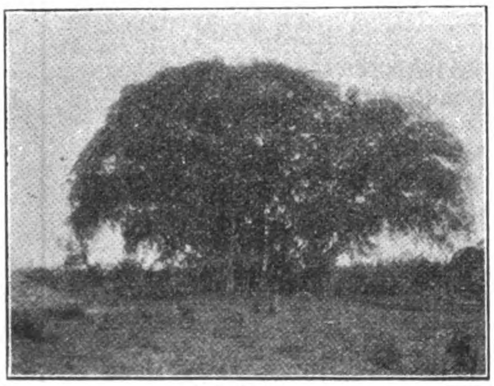
BUT THE TWAIN HAS MET AND BLENDED HERE

JAVA—THE WONDERLAND

HAVE YOU NOT YET VISITED JAVA?
IF NOT, DO SO NOW!

Bridge Bi Cis, Soerabaia Goods-shed, Java State Railways, Soerabaia City.

Girl Carrying Capoc.



Waringin.

Java, the peerless gem in that "magnificent Empire of Insulinde, which winds about the equator like a garland of emeralds," is the ideal tropical island, the greenest, the most beautiful and the most exquisitely cultivated spot in the East, the most picturesque and satisfactory bit of the tropics anywhere near the world's great routes of travel.

It fulfils the conception of what a paradise ought to be. It satisfies the imagination and more—for no Northern imagination ever conceived of skies so soft or indolent as these, of seas so serene and beautiful, of landscapes so exquisite or of nature so bountiful.

There is something here for every taste. The sportsman will find excellent big game shooting—the architect and the archeologist will delight in exploring the ruins of Buddhistic and Hinduistic temples. Those studying social and political problems resulting from colonial possessions can study here one of the most successful colonial systems existing. The geologist will grow enthusiastic over the many volcanoes active or quiescent, found here. At Buitenzorg, one hour's run from Batavia, the botanist has at his disposition the largest and best equipped Botanical gardens of the universe. The agriculturist will delight in the many cultures as f.i. rice, tea, coffee, rubber, etc., found here. Moreover, travelers are entirely safe in Java and even ladies alone can tour the island without inconvenience.

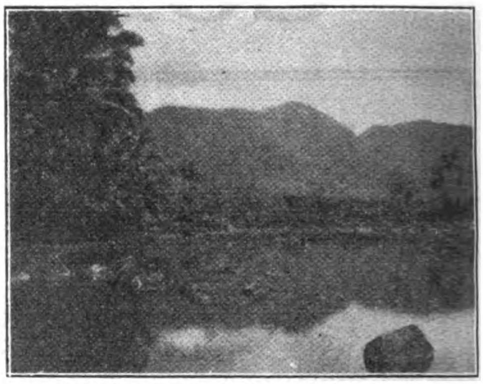
And to close this incomplete list of Java's advantages, it is singularly accommodating as regards climate. Thanks to the mountainous character of its physical conformation, and the different altitudes of its towns and hill stations, the visitor can select the climate best suited for his constitution. In a few hours he may change from the tropics to the temperate zone, may migrate from Batavia to Sindanglaja, 3,483 feet above the sea-level, or from Soerabaia to Tosari, at an altitude of 5,776 feet, and famous for its bracing air.

Few tourist playgrounds, in fact, are so favored, or possess a greater variety of attractive features.

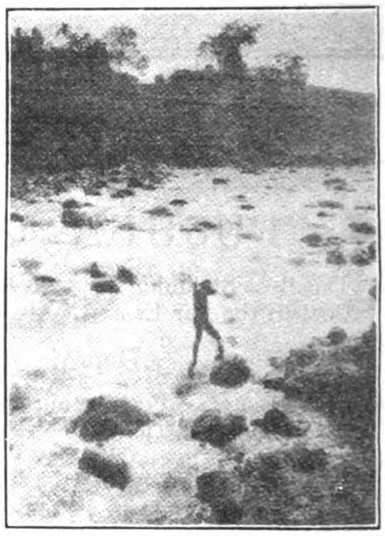
THE JAVA GOVERNMENT RAILWAYS own 2,629 miles of thoroughly equipped lines, passing through all the principal Tourist centres.

Comfortable travelling—frequent express and fast trains. Restaurant cars with efficient service in all express and fast trains.

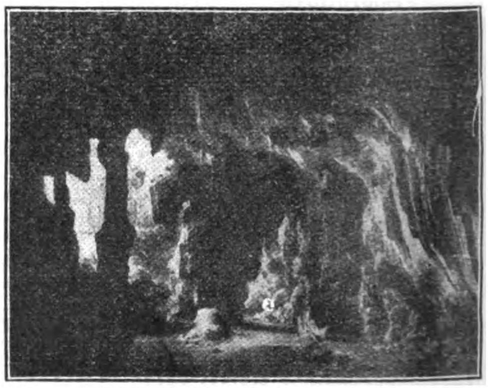
For full information and literature apply to the "Official Tourist Bureau" at Weltevreden, Rijswijk 18.



Pond in the Neighborhood of Garoet.



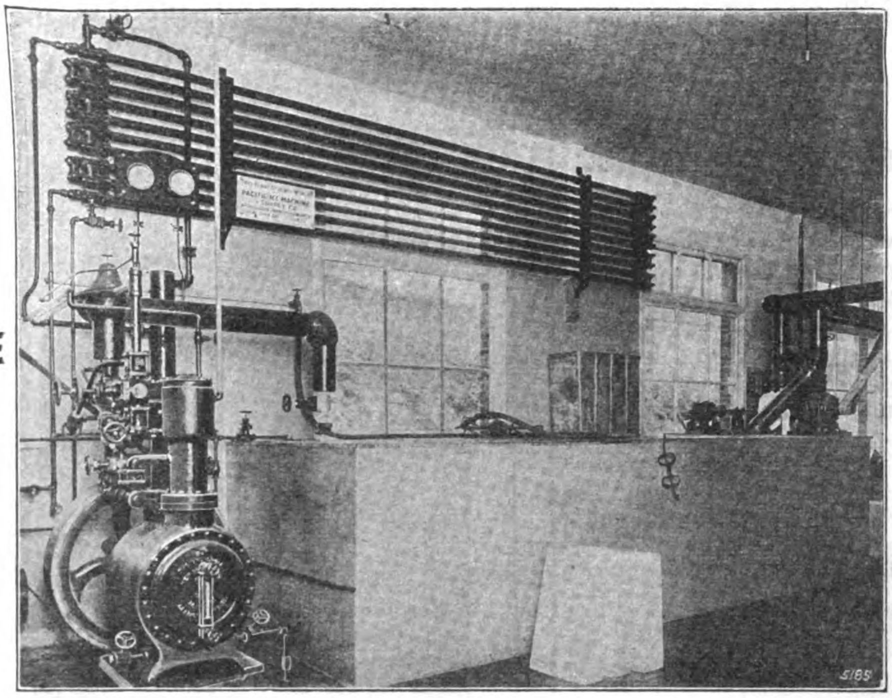
River Brantas, Malang.



Caves, South Coast, Java.

THE JAVA GOVERNMENT RAILWAYS

The photographs in this advertisement are from "The Joint-Stock Co., Photographer's Studio, Kurkdjian, Soerabaia."



BRUNSWICK ICE PLANTS

Here is the illustration of a typical standard Brunswick ice plant. It shows a plant which will produce two tons of ice daily. We also manufacture standard plants varying in capacity from two hundred fifty pounds to six tons. These plants are furnished for either steam or belt drive and are especially adapted to small towns, haciendas, plantations, large camps, cantonments, hospitals, etc.

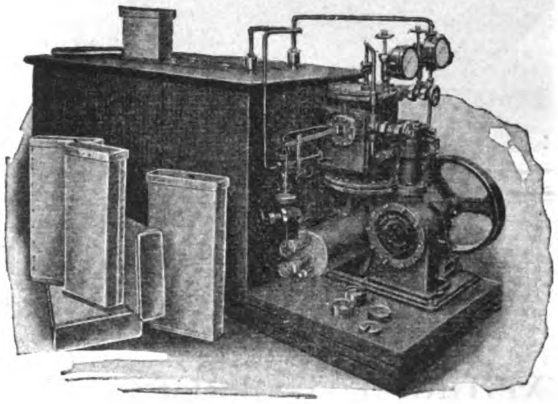
These plants are the finest of their kind. No pains have been spared to make them in every respect as perfect as possible. Their construction is simple. Their parts are few and interchangeable. They are strong, sturdy and rugged-built to stand hard usage and wear well. The running parts move free and true; the action is smooth and easy; the alignment of parts precise.

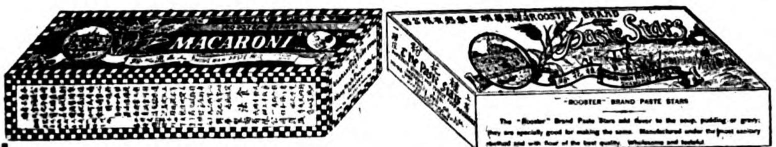
We want you to investigate these Brunswick ice plants if you are interested in ice-making machinery. You will find them built right, easy to operate, wonderfully efficient and dependable in every respect. Blue-prints and detailed instruction for installation and operation furnished with each plant.

A small, portable type is shown below. Detailed description in your own language on request.

BRUNSWICK REFRIGERATING CO.,

NEW BRUNSWICK, N.J., U.S.A.





Cable Address: "HINGWAH" Code used: A.B.C. 5th Edition

香港上海興華機器製麵有限公司

The Hing Wah Paste Manufacturing Co. Ld.

Macaroni, Paste Stars, Egg Noodles, Vermicelli, and all kinds of Soup Stuffs

All our Pastes bear the "ROOSTER" label and are made with Flour of the Best Quality containing a large percentage of Gluten, and are manufactured under the most sanitary conditions. Having been analyzed by the Government Analyst of Hongkong, our productions have been found to be free from adulterations and from any injurious ingredients.

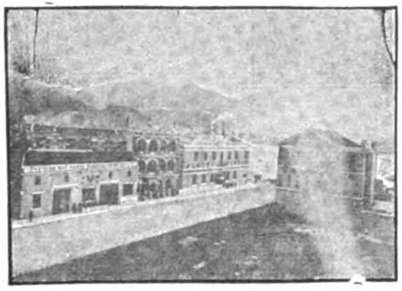
Large quantities have been exported to various parts in the World.

Your esteemed orders will receive our prompt and careful attention.

Terms moderate, especially for Agencies.

Head Office: Hongkong, Nos. 47-48 Connaught Road Central Tel. No. 2230

Branch Office: Shanghai Nos. 430-431 Nanking Road



Factories: Hongkong Wing Hing Street Causeway Bay and Shanghai No. 71 North Soochow Road

AWARDED GRAND PRIZE OF HONOUR
PANAMA PACIFIC EXHIBITION, SAN FRANCISCO, 1915.
MOST POPULAR **BEER** IN THE ORIENT

ASAHI YEBISU SAPPORO

BREWED BY

THE DAI NIPPON BREWERY CO., LTD.

HEAD OFFICE: TOKYO

BRANCHES OSAKA, SAPPORO, SEOUL, SHANGHAI, TSINGTAO.

SOLD EVERYWHERE

Agents: MITSUI BUSSAN KAISHA,
China, Straits Settlements, Dutch East Indies, and British India

Complete Boiler-House Plants

JOHN Thompson WOLVERHAMPTON LTD

All Types of Boilers and Accessory Plant

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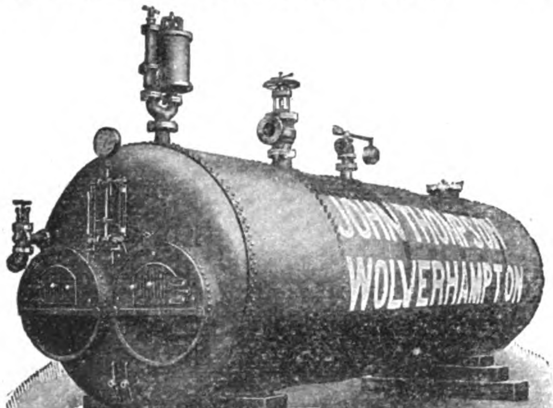
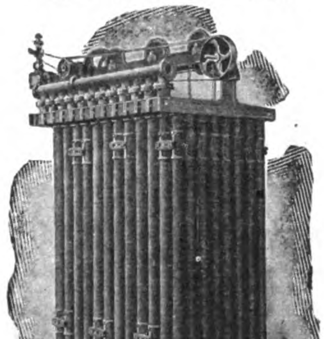


FUEL ECONOMISER



THOMPSON PATENT SECTIONAL SUPERHEATER

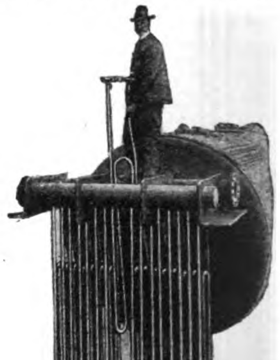


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FIG. W2621
IRON BODY GATE VALVE

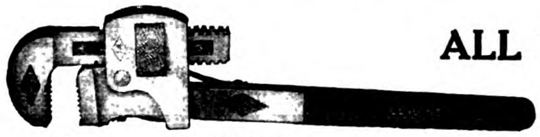

FIG. W4104

ALL WALWORTH QUALITY

FIG. W1323
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FIG. W3782
IRON COCK

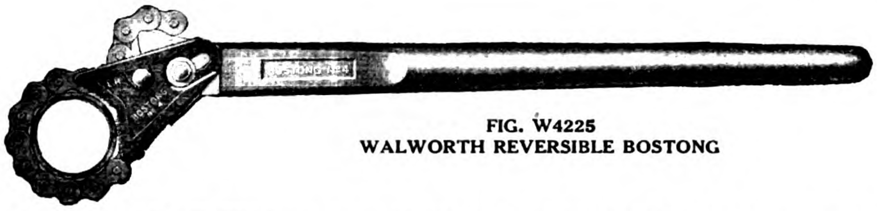

FIG. W4225
WALWORTH REVERSIBLE BOSTONG

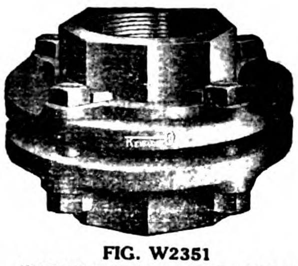

FIG. W2351
"KEWANEE" FLANGE UNION

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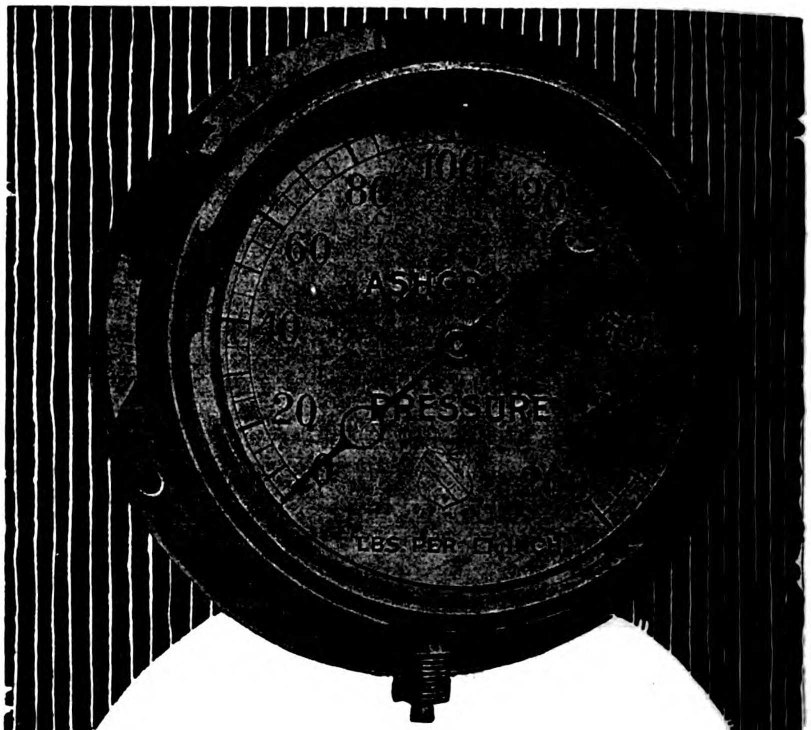

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DECEMBER 1921

ARMS AND AMMUNITION

The Largest Arsenal in China.—The arsenal proposed by General Chang Tso-lin is making considerable progress. Machinery costing $3,900,000 has been ordered from Denmark, to arrive in China about June 1922. The arsenal covers a site of five *li* by three *li* and will be surrounded by a wall 15-ft. thick. When completed it will be the largest arsenal in China.

AUTOMOTIVE

NEW ROADS, ETC.

Shantung Motor Roads.—The Peking government contemplates building three motor roads leading from Chefoo to Weihaiwei, Laiying and Haiyang respectively.

Kalgan-Urga Motor Service Resumed.—The ministry of communications has appointed Mr. Chen Shih-hua, director of the Peking-Suiyuan Railway, to take charge of the government north-western motor-car service. When the Anfu clique was in power in Peking, the motor-cars of this service run between Kalgan and Urga and back once a week but it was discontinued last autumn by the Chihli faction. Now by arrangement with Marshal Tsao Kun, the ministry of communications will resume the motor service both for commercial and military purposes.

Mongolian Motor Road.—General Ma Fu-hsiang, tutung of Suaiyuan, has applied to the government for the extension of the motor road from Paotaochen to Ningsha along the bank of the Yellow River. The communications authorities are considering the matter.

Auto Roads, China.—A road is to be constructed by the Chekiang provincial roads office, starting from Sin Chong Kwan Range, passing through the city of Chen Hsien to Chang Chen of Shan Yu, a distance of 200 *li*. It will cost $1,000,000. An automobile company will be established to operate this road. A motor service between Tsaochwang and Ichow, Shantung, has been inaugurated and a motor service is shortly to be inaugurated between Changsha and Siangtan.

Transport in Northwest Borneo.—For some little time past the Netherlands East Indies government has been giving increased attention to the development of the territory. Several good roads have been constructed, and the projected railway from Pontianak to Sambas will afford very much needed transport facilities. The market, actual and potential, for commercial motor vehicles is particularly worthy of exploitation, and it is stated that there is an ever-present demand in North-West Borneo for the three to five-ton type of vehicle. The projected railway can hardly absorb all the traffic which now uses the roads, and the estates will require transport for their produce to the nearest rail-head. The making of good roads and the facility with which motor lorries can be used for handling plantation produce have already led to a rapid increase in the numbers of commercial vehicles used.

New Roads, Siam.—A project is under consideration for the construction of a main road in Siam from the extreme north of the country to Bangkok, suitable for heavy motor traffic. It is also proposed to build a branch road from the main thoroughfare running from Lampang to Chieng Mai connecting this thoroughfare with Sawankalog, and eventually to build a trunk road down to Nakorn Sawan and Paknampoli.

Plans are also in progress for bridge work in addition to that railway development necessitates, and contracts may be anticipated in the near future for concrete bridges along the chief trade routes crossing rivers. Many of the existing wooden bridges are in a ruinous condition and schemes are being put forward to replace them with reinforced concrete structures.

Road Construction, Soochow.—It is reported that a macadamized and asphalted road from Si-men to Chien-van-lee-jao, Soochow, measuring about 10 *li* is to be soon built.

Hangchow-Yuehong Automobile Road.—The total cost of the Hangchow-Yuehong automobile road comes to $300,000 :—

(1) Construction of the road from Kwan-ying-jao in Hangchow to Shan-tao-lung, Yuehong, measuring 50 Chinese *li*, costs $195,000 including land price, bridges and sluices, pebbles and lime, at an average cost of $3,900 for one *li*.

(2) $75,600 will be devoted to purchase of automobiles : 8 3-ton passenger auto-buses each capable of accommodating 24 persons, for Tls. 40,000 at Tls. 5,000 each, 4 cargo buses for Tls. 10,000 at Tls. 2,500 each and 2 common buses for Tls. 4,000 at Tls. 2,000 each.

(3) Six stations at $1,000 each cost $6,000, general office and car sheds cost $4,000, making a total of $10,000.

(4) $10,000 is to be spent in purchasing furniture, fixtures and office equipment and appliance.

(5) $9,400 is to be set aside for meeting the office expenses.

New Transportation Co., Hsuchow.—The Yue Kong Transportation Co. is being organized at Hsuchow by Mr. Yuan Tsi-woo with a capital of $100,000. Application for approval and registration has been made to the ministry of agriculture and commerce.

New Road, Woosung.—Tenders are being invited by the Woosung improvement work department for construction of a modern road from Woosung Creek to Tai-shun-mu-jao, 3½ *li* long, survey of which has been completed.

New Auto-bus Lines, Yunnan.—Automobile roads are in the course of construction in Yunnan and there will be a good market for auto-buses in the province. At present, the Saigon Transportation Co. is trying to secure an order from the Yunnan authorities for supplying 15 "Fiat" buses each with an accommodating capacity of 1,000 kilograms. This offer is now under the consideration of Chinese officials. For facilities of transportation at sea, a steam navigation company is also being organized.

Changzo-Taichong-Shanghai Automobile Road.—Messrs. Chen Tien-nee, Pan Yue-ziao and Feng Chong-kung are planning the organization of Changzo-Taichong-Shanghai Automobile Transportation Co. with a capital of $500,000 in 10,000 shares of $50 each. The motor road from Changzo to Liuhu in Taichong, via Mayleedang, Tzodangching and Yaoching measuring 74 *li* will be built, while the remainder of the line from Liuhu to Shanghai has been already completed by the Shanghai-Taichong Automobile Transportation Co. For autobus service on the Shanghai-Taichong section the new company will operate in co-operation with the Shanghai-Taichong Co.

Osaka-Kobe Highway.—The state road between Osaka and Kobe will be reconstructed on modern lines. It will be 72-ft. wide and will carry the new track of the Hanshin Electric Railway Company. At present there are three railways between Osaka and Kobe—the Hanshin Electric, the Government Railway, and the Hanshin Kyuko—but they are insufficient to cope with the increasing traffic between the two cities. The completion of the new line will further add to the development of the district between Osaka and Kobe.

Automobile Co., Antung.—Messrs. Yang Ying-chong and Kong Yue-shu are organizing an automobile transportation company at Antung with a capital of $25,000.

Two Automobile Companies, Antung.—Mr. Yue Chiar-feng has applied to the authorities at Antung for permission to organize the Antung-Dahkooshan Automobile Transportation Co. Another similar organization is also being established with a capital of $25,000 by Mr. Yang Ying-chong to operate an autobus service between Antung and Loh-dao-kow.

Shanghai-Taichong Automobile Co.—With a view to hastening the completion of the automobile road, the Shanghai-Taichong Automobile Transportation Company has drawn up a series of measures stipulating that the road and bridges are to be completed by the end of the year at the latest. It is believed that an autobus service between Chapei and Lu-tien will be opened in January and on the whole line in February.

New Auto Bus Co., Honan.—The Kiu Tan Automobile Transportation Co., Honan, which plans to run a service from Hwai-yang to Lu-hsien, Mr. Yuan Kan-ping has been granted permission by the provincial authorities.

Lee Hua Automobile Co., Hsuchow.—The Lee Hua Automobile Transportation Co., Hsuchow, organized by Messrs. Yuan Yue-van and Le Shiao-ngian, is now ready to operate. Auto-buses ordered from Yee-chong & Co., Shanghai, have reached Hsuchow. If the enterprise proves successful its services will be extended to the neighboring cities.

Automobile Road, Changchow.—Some citizens of Changchow are planning to build an automobile road from the east gate of the city to Wang-ling, a commercial centre of Changchow. The road will have a distance of about 30 *li* and the construction cost is estimated at $30,000.

The Uchida Automobile Company, organized recently with a capital of Y.38,000, quarter paid up, to manufacture motor cars and lorries. Office at 944 Chafu, Ibara-gun, Tokyo-fu. Manager: Mr. Y. Watanabi.

Motor Service to be Inaugurated, China.—The Paoting-Kaoyang Motor Service Co. is subscribing an increased capital of $100,000 in 500 shares for the purpose of extending the service to Tientsin. —*Yih Shih Pao.*

The Peking-Haitien motor service has been resumed.

Trucks in Canton.—China is coming to the forefront in the use of motor trucks and motor transportation. A motor bus line in Canton, China, is operating 15 F.W.D. trucks manufactured by the Four Wheel Drive Auto Co., of Clintonville, Wis. The trucks are equipped with passenger bodies of a Chinese make, and each truck hauls a trailer which is similarly equipped. One unit consisting of a truck and trailer has a seating capacity of 70 persons.

Honan Auto Bus Service.—During the last two years, the Chiuta and two other motor companies have been organized by Chinese capitalists for running cars between Honan, Shansi and Shensi. The most successful company is the Huai-Lo long distance motor-car corporation which has imported some foreign cars from Peking and Tientsin for the purpose but the majority are still native-made carts and busses. The company is building ferries across the Shaho river for the extension of its business.

Soochow-Kashing-Huchow Automobile Road.—Mr. Chen Wai-yue of Soochow and other gentry of the neighboring districts, are organizing a company for construction of a Soochow-Kashing-Huchow automobile road, 735 *li* in length, with a capital of $3,000,000. The proposed road will be divided into five lines running in different directions; the first will run from Soochow to Huchow via Wookiang, Pingwang and Nanzing and to Kashing via Wookiang, Pingwang and Chen-shih with a distance of 181 *li* and 36 *li* respectively. The second line runs from Soochow to Fu-san-ching via Chang-zoo measuring 166 *li*, the third from Soochow to Taichong via Quinshan measuring 100 *li* connecting with the Shanghai-Taichong automobile road, the fourth from Kashing to Sho-poo-ching via Ping-hu measuring 80 *li* and the fifth Huchow to Kwang-teh via Chang-shing and Sze-an measuring 172 *li*. The road, when completed, will greatly facilitate communications by leading to the Yangtze river on the north, to Hangchow Bay on the south, to Shanghai on the south-east by the Shanghai-Taichong motor road and to Anhwei provincial road on the west by Kwang-teh.

Ningpo-Fenghua Automobile Road.—Mr. Chen Sze-shia has applied to the provincial authorities of Chekiang for permission to build an automobile road from Ningpo to Fenghua on which auto-bus service will be operated.

Automobile Companies, Shantung.—The ministries of agriculture and commerce and communications have granted permission to Mr. Liu Ying-ching to organize the Wuting-Yuechen Automobile Transportation Co. with a capital of $500,000, Mr. Bao Lien-sui the Yuechen-Tungchong Automobile Transportation Co. with a capital of $500,000 and Mr. Ma Wai-chiar the Tsinan Tramway Co., in Shantung.

Wuting-Yucheng Motor Service.—Liu Ying-chuen has raised the sum of $500,000 for the inauguration of a long distance motorcar service between Wuting and Yucheng. A similar organization with an equal amount of capitalization is being promoted by Pao Lien-shui, who plans a motorcar service between Yucheng and Tung-chang. The ministry of agriculture and commerce has already approved their applications for registration.

Kowloon Motor Bus Company, Ltd.—This company has been formed by Mr. Louie S. Pang, negotiations successfully concluded with the government, and the service will be opened with nine Ford one-ton trucks fitted with Goodyear pneumatic tyres and electric starters. Special bodies are being built at Shanghai by the Universal Motor Car Body Works, with accommodation for 18 passengers in addition to the driver. The bodies are of the open type with permanent roof fitted with side screens for use in wet weather. A running board runs the length of the body and seats are arranged cross-ways. All the buses will be electrically lighted. The trucks have been supplied by Messrs. Alex Ross & Company. The garage, is extremely well equipped consists of a well-lighted workshop, storage sheds, wash deck and a large open courtyard. Although a start is being made with nine buses it is the intention of the promoters to enlarge the service in order to meet the anticipated growing demands.

Motor Cars in Peking.—Peking at present has 1,308 motor cars, of which 32 are owned by the Chinese government, 45 by diplomatic corps and the remaining 1,231 by individuals and automobiles companies. In this year, the number of cars exceeds that of last year by about two-thirds.

Chefoo-Weihsien Road.—The construction of Chefoo-Weihsien automobile road has cost $756,580.03.

Motor Road Planned by Nanyang Tobacco Co.—For facilitating transportation of leaf tobacco collected from that locality, the branch office of the Nanyang Brothers Tobacco Company at Liu-fu-zi in Fengyang, Anhwei, will construct an automobile road from Men-dan-tze to Liu-fu-zi viâ Ma-an-shan, Mu-shan-pu, Ngao-wang, Liu-kwan-kiu-zi and Cho-ling-pu. If sufficient funds can be raised, the proposed line will be extended to Luchow.

New Market, Shanghai.—Chu Pao-shan and Chao Jeng-poo with several others have purchased about 2,000 *mow* in the vicinity of Ying-chiar-hong on the military road, link of Shanghai and Woosung, for the purpose of organizing a land investment company and building a number of new villages. For facilitating communications, construction of a modern road to make connection with military road is also planned.

Auto Bus Service, Heilungkiang.—A transportation company has been established in Heilungkiang, operating an auto bus service from Heilungkiang to Heiho.

Roads, P. I.—For the upkeep and maintenance of the provincial roads over all the islands, Director Jose Paez of the bureau of public works, in his memorandum report which will soon be submitted to the authorities, is asking for an appropriation of P.5,500,000 for next year, in addition to P.7,000,000 the amount needed for the completion of all public works, which were suspended recently due to lack of funds.

According to Director Paez, the Philippines is covered by 9,816 kilometres of first, second and third classes road, aside from 4,490.2 kilometres of trails which are found in the Mountain Province and other provinces of Mindanao.

The road kilometreage of the islands is distributed among the different provinces as follows:

Abra, 74.8; Agusan, 42.0; Albay, 283.1; Antique, 220.7; Baguio, 42.2; Bataan, 57.5; Batangas, 361.6; Benguet, 82.0; Bohol, 308.0; Bukidnon, 131.0; Bulacan, 310.0; Cagayan, 179.2; Camarines Norte, 46.9; Camarines Sur, 210.8; Capiz, 289.5; Cavite, 202.8; Cebu, 639.0; Cotabato, 66.4; Davao, 63.4; Davao, 63.4; Ilocos Norte, 190.0; Ilocos Sur, 172.9; Iloilo, 453.9; Isabela, 225.2; Laguna, 232.0; Lanao, 28.3; La Union, 150.8; Leyte, 260.3; Marinduque, 50.9; Mindoro, 62.8; Misamis, 252.7; Mountain Province, 341.0; Nueva Ecija, 403.6; Nueva Vizcaya, 127.8; Negros Occidental, 532.5; Oriental Negros, 232.8; Palawan, 36.0; Pampanga, 335.3; Pangasinan, 642.7; Rizal, 192.1; Romblon, 2.6; with 292.9 kilometres of trails; Samar, 239.3; Sorsogon, 213.1; Sulu, 65.8; Surigao, 57.7; Tarlac, 171.9; Tayabas, 171.9; and Zamboanga, 128.1.

The report shows that there are in the Philippines 4,698.8 kilometres of second class and 3,079.8 kilometres of first class road, 2,039.5 kilometres of third class road.

Road Development, Mongolia.—The Northwest Motor Service Company of Peking has planned four main routes as follows:—1. From Kalgan to Dolon-nor; 2. From Kalgan to Shangtu; 3. From Pingtichuan to Taoling; 4. From Fenchen to Lienchen.

Roads, Shansi.—On September 25 a ceremony was held to celebrate the opening of the Pingling road. Those in Pingfeng and Fengchun were opened November 2.

Shanghai and Chuensha Roads.—Surveys of the proposed district roads of Shanghai and Chuensha are being made and the public has been notified by the Shanghai magistrate that construction work will soon be started. The roads will have a width of 30-ft. with trenches 5-ft. long on both sides, while the section from King-ning-sze to King-chiar-jao, the most prosperous part on the line, will be extended as wide as 50-ft. including trenches.

Kirin Roads.—The police superintendent of Kirin has instructed the public works department to have the roads immediately repaired. The fund is to be provided by the license department, any deficency being subscribed from the public.

Ningpo-Fenghua Automobile Road.—Mr. Chen Shia-sze has applied to the provincial authorities of Chekiang for permission to construct an automobile road from Ningpo to Fenghua and organize an automobile service.

Chengtu-Chungking Road, Szechuan.—The Chengtu-Chungking road will run through Hu-chuen, Sui-ning, Hwai-chow and Chow-chiar-ching. The survey of a definite line under direction of a German engineer will be commenced when an appropriation of $10,000 is made by the salt gabelle.

Shantung Motor Roads.—A special bureau will be established to undertake the construction work of three automobile roads from Chefoo to Wai-hai, Lay-yang and Hai-yang respectively. The scheme has been formulated by the commissioner of customs at Chefoo and an appropriation of $240,000 will be made by the salt gabelle for the purpose.

Modern City Roads Construction in Anhwei.—Mr. Chow Tsi-tze of Chiu-poo, Anhwei, has decided to build a modern road from Tung-liu to Chiu-poo construction work on which will be started soon. Mr. Chow is also planning the construction of an automobile road from Anking to King-teh-ching.

Road Construction, Antung.—The arrangements for building new city roads in Antung as proposed by local merchants have been completed and a Dutch engineer employed to survey the line.

Waichow-Changchow Highway.—Work on the construction of a modern highway between Waichow, Kwangtung, and Changchow, Fukien, is being carried out by the public roads bureau. The section of the road from Chok Yuen Kok to Chung Tung, village has been completed.

After the final harvest, the bureau is expected to employ more workers to take charge of the work. It is reported the whole road will probably be finished in a few months.

New Dairen-Ryojun Road.—The c nstruction of the new Dairen-Ryojun (Port Arthur) road, started early last October, will be extended as far as Hsiaopingtao (Shoheito).

A new bridge will be built over the Lingshui River in the most picturesque scenery in and about Dairen.

Sea-Planes for China.—The minister of the navy, Admiral Li Ting-hsin, has recommended the creation of a fleet of seaplanes and the establishment of a training school for pilots. The government has approved this suggestion.

Airplane Works, Japan.—The aeronautical bureau of the war department has been making a close investigation of the status of factories engaged in the manufacturing of airplanes and motors in Japan. The factories engaged in this line of trade are reported on as follows :—

Kawasaki Dockyard Company, Kobe : This company has a patent right for the sales of Salmson machine and is engaging in the manufacturing of machines and motors to be principally supplied to the army.

Mitsubishi Shipbuilding Yard, Atsuta : This company is engaging in the manufacturing of machines of the Newport type to be supplied mainly to the imperial navy.

Nakajima Works, Ota : This works is maintained by Engineer-Lieutenant Commander Nakajima, on the reserve list, and is engaging in the manufacture of Newport and Nakajima machines for the imperial army and navy.

Ito Aeroplane Laboratory, Tsudanuma : Machines now used by private aviators in Japan are mostly made by this company. They are made on designs by Mr. Inagaki.

Kawanishi Works, Hyogo : This works has detached itself from the Nakajima works and manufactures machines of its own design.

Tokyo Gas and Electric Industrial Company, Ohmori : This company has a patent right for the manufacture of Ronne motors and has begun operations on a limited scale.

Japan Steel Works, Muroran : This works supplies the imperial army motors of the Daimler pattern.

Ikegai Works, Shiba : This works has had much experience in the manufacture of gas engines and has recently erected a new factory at Tsurumi for the construction of air motors.

Andrews and George Company's Laboratory : This Laboratory at Kyobashi, Tokyo, is the only factory in Japan engaged in manufacturing spark plugs and magnetos for airplanes.

Peking-Shanghai Service Abandoned.—Owing to the lack of funds, the one hundred and sixty special police officers and men who have been trained by General Ting Ching for the protection of the aerial stations in Peking and Tsinanfu will be disbanded soon. Besides, on account of his inexperience, General Pan Chu-yin, the new director of the government aeronautical bureau, has definitely given up the proposed air mail and passenger service between Peking and Shanghai via Tsinanfu, so that the members of the bureau have now practically nothing to do at the moment. The bureau will either be amalgamated with the ministry of communications or be abolished, chiefly because of lack of funds for its maintenance, and as a matter of fact, China has practically no need for an air service either commercially or otherwise. Mr. Chin Kuo-yung, councillor of the bureau, who is considered to be one of the best Chinese aviators, has been appointed Chinese representative to the international aeronautical conference in Europe and he is leaving for his new post shortly.—*Asiatic News Agency.*

Aeroplanes for Military.—In the belief that hostilities between the North and South is unavoidable, General Wu Pei-fu has sent delegates to Shanghai to order five aeroplanes from a certain foreign firm. Negotiations regarding this are being carried on.

Aerial Loan Reported.—A report that the aerial bureau is negotiating a loan with a certain foreign firm is revived with redoubled strength on account of the trip of Mr. Pan, chief of the bureau, to Tientsin.

New British Planes for Aeronautical Department.—A shipment of four aeroplanes ordered from England has lately arrived at Tientsin, for transportation to the aeronautical factory, Peking.

Peking-Lanchow Aerial Line.—The aeronautical department at Peking has wired to the tuchun of Kansu stating that a decision has been reached by the department to materialize the Peking-Lanchow aerial line and requesting him to purchase a lot of land covering 300 *mow* for site of the aerodrome.

India.—The air board of India, under the commerce department, is a purely advisory body without executory functions. As soon as funds are available, the government of India has decided to prepare a trunk air route from Rangoon (via Calcutta and Allahabad) to Bombay. When this route, or a section of it, is completed, tenders will be called for an air mail service over the completed portion. Local governments in India have also been empowered to lay out air routes within their own boundaries.

Japan.—The program of the air bureau includes the consolidation and encouragement of civil aviation, the supervision of private undertakings, and the establishment of an international air route. Civilian pilots are to be trained at the Military Aviation School, 292 applications having been received for ten vacancies available in 1921.

New Kansu Air Line.—The aeronautical department plans to assign thirty aeroplanes to the proposed Peking-Shansi-Shensi-Kansu air line. Aerodromes will be established at Lanchow, Changan and Shan-yuan. The actual construction work of the line will be probably commenced in next January.

Japanese Aviation Plans.—Ja anese aviation authorities, it is announced, are making preparations for the establishment of an aerial port near Tokyo. This port is intended to be the first of many airdromes to be constructed in Japan, Korea, Saghalien, etc. It is to comprise a training ground, landing place, warehouses, customs house, hospital, wireless installations, a signal tower, etc., also equipment for night flying. The fact that this air port will be placed under the control of the Imperial Japanese aviation bureau will serve to make it an important military asset in time of war. In time of peace, however, it will be a welcome training ground for civilian aviators who have long felt the necessity thereof.

Aviation Troubles, Peking.—According to the terms of the Vickers Company loans with the Chinese government a certain number of foreign experts and advisors must be retained by the department. A petition was recently sent to the cabinet for necessary funds for the department by one of these foreign official without the proper authority to request such funds. The petition was refused. Thereupon the official resigned and reported at the British legation that the Chinese government was not sincere in carrying out the aerial service and therefore the Vickers Company should immediately demand payment of principal and interest on the loan. He at the same time wired the Vickers Company to the same effect urging it to stop further advances to the aeronautical department.

Chinese sources give no definite information as to the outcome of the controversy but state that the trouble is not yet over and that the foreign official is demanding that certain Chinese officials be removed from the department before he will consider returning.—*China Press.*

BUILDINGS

Reconstruction at Hankow.—It is announced that Mr. Tang Hsiang-ming, newly-appointed director of market reconstruction at Hankow, assumed his post recently.

Concrete Home, Japan.—Mr. H. Kawasaki, president of the Nippon Fire Insurance Company, is building a new summer home of re-inforced concrete at Hayama, costing about Y.50,000. An American Engineering and Architectural Company designed the building.

Shanghai-Woosung Land Co.—A lot of land covering over 1,000 *mow* has been purchased at Kiangwan and houses will be built thereon, which will be rented at a low rate. The company is capitalized at $1,000,000 in 100,000 shares of $10 each. Mr. Chu Pao-shan and Mr. Hsu Kwannan are the promoters.

New Chinese Chamber of Commerce Building, Northern Kiangsu.—The new building of the general chamber of commerce of Nantungchow, Tungchung and Naitai, which covers a site of 10 *mow* at Garden Road, Nantungchow, has been completed at a cost of Tls. 160,000.

New Post Office Building, Chinkiang.—A three-storied new building for the Chinese post office at Chinkiang will be built at King-shee-ling. A fund of Tls. 60,000 has been appropriated by the ministry of communications.

New Warehouse, Pootung.—Merchandise received by Shanghai warehouses for the month of October was about ten times as much as in the previous months. Shanghai is at present overstocked with every kind of goods owing to dullness in market. Some warehouses are trying to expand the space and many new ones are under contemplation. At Loh-shiar-tze, Pootung, a storehouse covering over 60 *mow* is being built by a Japanese firm, Ling Hua & Co. The new structure which is to be known as Ling Hua North Storehouse will have adequate wharfage facilities.

New Hotel, Yokohama.—Yokohama is to have a new hotel by February, 1923, located on a site directly across from the Yokohama central station. The cost will be Y.1,000,000.

The building is to be four and five stories high with 300 rooms. The first floor will be devoted entirely to an office, lobby, dining room and recreation rooms. It will be built of re-inforced concrete.

The architectual drawings have been approved, and work will be started as soon as possible. It is expected that the hotel will be opened in February, 1923.

New Yokohama Hotel.—Yokohama is to have a new foreign style hotel by February 1923. The hotel is to be erected across from the Yokohama central station and will cost Y.1,000,000.

The building of re-inforced concrete is to be four and five stories high with 300 rooms.

The architectural drawings have been approved, and work will be started as soon as possible.

New Office Building, Hongkong.—No time is to be wasted in completing the plans for the erection of a palatial skycrapper on the old post office site, fronting Queen's Road and Pedder Street recently purchased by Mr. R. H. Kotewall and his associates, says the *Hongkong Telegraph.* The plans are now in process of completion by Messrs. Little, Adams and Wood. Although the conditions of the sale permit of a building having as many as nine stories, in order to give plenty of air space on each floor, the building will have only eight stories, and will be designed to harmonize with the surrounding buildings.

New Hotel for Maiko, Japan.—Maiko, one of the scenic resorts near Kobe, soon will have a

modern hotel. About 80,000 *tsubo* of land have been purchased by the promoters at a spot named Inariyama.

The building will occupy some 300 *tsubo*. The buildings and the land cost approximately Y.500,000.

New Lighthouses, Hongkong.—Three new lighthouses are to be built at Tongku, Lantong Island and Channel Rocks, which are the most dangerous unlighted spots when one approaches the harbor of Hongkong. The Tongku tower will be of granite and the other two of reinforced concrete. All will be equipped with Aga lights having a range of ten nautical miles in clear weather.

New Railway Hospital, Tashihchiao.—The S.M.R. Co. started work on a new railway hospital building on a site of 618 *tsubo* at the railway town of Tashihchiao early in October.

The premises now occupied by the hospital there have been left by the Russians and have become too small and are too close to the railway.

Kobe's New Library.—The new Kobe municipal library, one of the best libraries in Western Japan, has been opened. It has cost about Y.250,000.

It is a reinforced concrete building of two stories and basement. The main reading room on the second floor occupies 161 *tsubo*, accommodating 400 persons. There is a roof-garden and arrangements were made so that it can be used as a reading place during the summer.

Close to the main building is a fire-proof warehouse of five stories where books are to be stored. The building is steam heated throughout and special attention has been paid as to the ventilation and light.

Telephone Exchange, Japan.—Bids for the construction of a new telephone exchange building in Yokohama will be opened by the department of communications in November. The building is to be a steel frame structure of six stories, including the basement. The total cost of preparing the new building for the exchange is estimated at nearly Y.1,000,000.

Tokyo Public Library.—The Tokyo municipality will include in the budget for next year an appropriation for the establishment of a library, bigger than the Uyeno library, reputed to be the largest in Japan. The building will be a three-storied structure of re-inforced concrete, and the upper floor will be made in to an auditorium.

Building, Manila.—The September report of the city engineering and public works department shows that 102 strong material buildings and 31 mixed and light material houses were constructed during the month. The total of the strong material buildings constructed in September amounted to P.466,050, while that of mixed and light material buildings was P.14,540.

New Medical School, Shanghai.—Plans for the erection of a union medical school in Shanghai, with a total investment of $1,000,000 for buildings and equipment, are in the hands of a committee delegated from the universities and colleges in East China. The object of the school, according to Dr. J. C. McCracken of St. Luke's Hospital will be to afford a completely equipped medical school in Shanghai district, drawing its students from the several universities.

The union school, as advanced in its present plan, would be financed by the universities in the district, who would be thus relieved of the heavy expense of maintaining individual medical departments, according to Dr. McCracken.

New Buildings, November, Shanghai.—

*Buildings under construction	575
W. C. installations under constructions	39
Plans submitted for approval	133
Plans approved	103

New Government Building, Shanghai.—Plans for the new building for the bureau of foreign affairs and the Shanghai Taoyin's yamen have already been drawn up and are being submitted to the higher authorities for their approval. The building will probably be of foreign style and of reinforced concrete.

City Library and Town Hall, Canton.—Mayor Sun Fo recently proposing that the piece of land in front of the first public park should be utilized for building a city library and a town hall. Mayor Sun states that although Canton has made many improvements it is still lacking of public libraries and a good town hall. By erecting the proposed library the citizens will be enabled to read during their leisure hours. As to the town hall, it will serve as a place for public meetings of the people.

BRIDGES

A New Muda Bridge, F.M.S.—The government of Kedah will invite tenders for the construction of a steel bridge across the Muda River, near Kuala Ketil. The proposed bridge will be one of eight spans of thirty feet, and six piers of a width of ten feet, the total weight of the steelwork of the projected bridge being 150 tons.

Proposed Steel Bridge, Canton.—A member of the provincial assembly recently proposed that a steel bridge be built from the bund to Honam in order to facilitate communications between the city proper and Honam. The proposal has been submitted to the governor for approval.

ELECTRIC LIGHT AND POWER

TRAMWAYS, ETC.

Electric Meter Factory, Japan.—Siemens, Schukert & Company and the Furukawa Electro-Industrial Company have decided to erect a factory for the purpose of constructing meters capable of measuring weak electric currents. No such meters are made in Japan at the present time.

Baron K. Nakajima, president of the Furukawa Company, will inspect European factories while with the business men's mission and upon his return to Japan, definite plans will be formulated for the joint construction of the factory.

Electrification Policy for Japan's Railways.—A fundamental policy for the electrification of Japanese Railways has been formed by the electrification investigation commission. In consequence, the following sections having an aggregate mileage of two thousand miles have been designated for the conversion into electric lines:

All sections in the suburbs of cities where there is heavy railway traffic, such as:

Section	Miles
Kyoto-Kobe	47
Kobe-Himeji	34
Minatomachi (via Kitsu) Kyoto	51
Moji-Hakata	48
Osaka-Tennoji	6

Sections of high gradient where there are many tunnels and also those where abundant water-power can be utilized, such as:

Section	Miles
Odawara-Numazu	26
Maibara-Imasho	47
Hachioji-Shiojiri	116
Nagoya-Shinooi	151
Fukushima-Yonezawa	26
Yashiro-Kashima	94
Kameyama-Nara	46
Utsunomiya-Nikko	25
Koriyama-Niigata	172
Oguda-Shinjo	58
Takasaki-Yokokawa	18
Karuizawa-Naoetsu	92

Sections were shortening of the line is required and where water-power can be utilized, such as:

Section	Miles
Numazu-Kyoto	244
Ohmiya-Fukushima	151

Sections where the increase of transportation capacity and the shortening of the line are required, such as:

Section	Miles
Himeji-Shimonoseki	295

Sections where available water power can be utilized, such as:

Section	Miles
Imasho-Naoetsu	181
Nagoya-Kameyama	38
Ohmiya-Takasaki	46

Sections where the increase of carrying capacity is required and where coal can be obtained at a low price, such as:

Section	Miles
Kokura-Wakamatsu	56
Muroran-Yubari	90

Japan Places Orders in Germany.—Japanese electric companies are placing orders in Germany for generators and transformers. In connection with the indemnities payable to the allied countries, says the Osaka *Mainichi*, Germany fixes both domestic and export quotations for her manufactures, but nevertheless even the export quotations are far lower than those in Britain and America. Another reason for which Japanese prefer Germany is that owing to there being few labor controversies there she can deliver the contracted goods with comparative security, whilst as regards Britain and America it is unforeseen when they are in a position to fulfil shipment, as they are constantly suffering from labor disputes. It appears, however, that Germany, snowed under by orders from Britain and America, has little capacity for the manufacture of generators, though simple machines like transformers can be delivered at the time appointed.

Kyoto Municipal Plant.—The Kyoto municipality is planning a large electric power station (steam) at an estimated cost of Y.4,300,000, to be completed within three years. The total area covered by the station will be 3,000 *tsubo* of which 500 *tsubo* will be occupied by buildings of ferro-concrete and brick. Two generators, each of 5,000 kilowatt capacity, will be installed.

Osaka-Kobe Electric Railway.—The Osaka Hanshin Kyuko Electric Railway Company (the line between Osaka and Kobe) intends to construct an elevated line between Osaka and Juso and also to double the present lines, at an estimated cost of Y.3,000,000. The company will also construct an underground railway from is Kobe terminus to Motomachi, at an estimated cost of Y.7,500,000. For these projects it is expected that the company will raise debentures to the amount of Y.10,000,000 through the Mitsui Bank.

Electric Railway, Tokyo to Nikko.—An application for permission to construct an electric railway between Tokyo and Nikko, accompanied by a written opinion of Mr. Usami, governor of Tokyo prefecture, in favor of the scheme, has been presented to the railway department.

According to the plan, the line would start from Sugamo, Tokyo, and end at Nikko, covering a distance of 81 miles and 70 chains. A company with a capitalization of Y.25,000,000 is proposed.

Railway Electrification in Japan.—An elevated electric railway, 7½ miles in length, is being planned for Kobe by the town planning committee of Hyogo prefecture. Quadruple lines will be laid. In the city proper, beneath the elevated line, a road for vehicles and pedestrians will be built. In the suburbs, embankments and roads will be built parallel to the tracks, and streets varying from 36 to 144-ft. wide will be built in all directions from the new track. These surface roads will be of concrete or asphalt. The rails and other materials for the electric line will be purchased partly in the United States and partly in Europe.

Orders have been placed with American manufacturers by the Kobe railway bureau for 12 electric locomotives at a price of approximately Y.130,000 each, which is Y.20,000 to Y.30,000 more than the present steam locomotives are cost-

*These figures refer to the number of blocks of buildings under construction, the number of houses would be considerably greater.

ing the railway bureau. These electric locomotives are the first to be ordered in connection with the execution of the plan for electrifying the main line railway between Kobe and Tokyo. The first section of the line to be so transformed is that between Akashi and Kyoto. Overhead wires for carrying the current will be erected shortly. The cost of putting up these wires between Osaka and Kobe is estimated at Y.500,000. The electrification of this section of the railway has been contemplated for some time, but operations have been held in abeyance because of a lack of electricity in Japan. This has been remedied, however, and operations will commence at once.

The Bankai Electric Railway Company, one of the most flourishing companies of the kind in Japan, intends to extend its line from the present Hirano terminus (branch line) to the town of Kashiwara, Minamikawachigun, covering a distance of about 4 miles, official permission for this extension having been secured.

The railway department has decided, says the *Tokyo Asahi*, to submit to the next session of the imperial Diet a bill for the electrification of the Tokaido Railway between Tokyo and Kobe, and of the Central Eastern line between Tokyo and Kofu.

New Electric Tramway, Japan.—The government railways of Japan has granted a charter to the Gyokunan Railway Company promoted by Mr. T. Inouye and others for the construction of an electric railway, 11.06 miles in length, between Fuchu and Hachioji, important towns near Tokyo.

Hydro-Electric and Railway Supplies for Sunning.—Ng Yee-yin, Ng Yau-pong and Chin Minglee, members of the staff of Chin Gee Yee, president and general manager of the Sun Ning Railway Company, with headquarters at Sun-ning, Canton, China, are in Seattle, to purchase equipment for the railway company. Chin Gee-yee, who became a railroad magnate in China after 25 years residence in Seattle, which he regards as his "American home," has directed these men to get in touch with the chamber of commerce and Seattle business men. The visitors are particularly interested in hydro-electric development and terminal facilities.

Electrical Demand.—In Asia and the Far East, China, British India, and Japan are America's largest electrical customers, and all three countries show considerable increases. The growth of the trade in British India was especially notable in view of the rather limited channels available for the sale of American goods. Japan's increase was also noteworthy when consideration is given to the fact that she is herself a producer of large quantities of electrical goods and in many markets of the Orient and Australasia a competitor of America in the electrical field. The only important electrical market in the Far East where there was an appreciable decrease in the buying during 1920 as compared with the preceding calendar year was in the Dutch East Indies, where the sharp slump in sugar was apparently directly responsible for the decline. New Zealand, where business conditions are usually quite stable, shows a slight increase in exports as compared with the preceding year, but Australia, where the depression was felt more keenly, shows a decrease. A lessened buying might be expected in both of these countries in view of the break in value of the principal commodities which they produce—wool, meats, wheat, hides and skins, and dairy products. In the case of Australia, an increase in the tariff rates and the placing of certain restrictions upon electrical products in competition with similar British goods have no doubt contributed to the decrease in our electrical trade with that country.—C. R.

Electrical Orders, Manchuria.—Although import business is generally dull in this district, electrical and telephone materials command a ready sale. It is stated that an order has been placed with an American firm for a large supply of automatic telephones and with a German firm for 3,000 electric-current meters. Many outlying districts in South Manchuria contemplate installing electric-light plants.—C. R.

Electric Light Plant, Taishun.—It is reported that an electric light plant is under organization at Tai-shun, a town near Chinkiang.

Tseng Hua Electric and Engineering Works.—The Tseng Hua Electric and Engineering Works of Soochow, now being organized, has decided to purchase a site at Wang-ting instead of at Hsukwan as originally proposed. This new and modern institution is promoted by Mr. Sze Chaotseng, director-general of the Lunghai Railway, and Mr. Chang I-pang, ex-vice-minister of justice, to be capitalized at $1,500,000.

Electric Light Plant, Huchow.—It is reported that the Tung Loo Electric Light Plant at Linghu of Huchow, Chekiang, has recently ordered a new dynamo from Shanghai.

New Electric Light Plant, Manchuria.—An electric light plant promoted by Mr. Wang Fushun is under organization at Wu-chen-hsien, Manchuria. The new company is to be capitalized at $50,000 in 500 shares of $100 each.

Electric Light Plant, Kashing.—It is reported that an electric light plant is being organized at Pu-yuan-ching, Kashing, by Mr. Chow Mao-dang, manager of Kashing Telephone Co. Registration of the company has been made with authorities.

New Electrical Plants, China.—The Gelaren Electric Company of China, Ltd., has recently secured the contracts for the extension of an electrical plant for a large Chinese city consisting of a direct coupled steam engine dynamo lighting set capacity 1,000 K.W. with Witton-G. E. C. alternator and Howden triple-expansion high-speed steam engine, with main switchboard feeder panels and various accessories.

Another contract for extension plant consists of 500 K.W. Witton-G. E. C. alternator coupled to Belliss and Morcom triple-expansion steam engine with high-tension switchboard panels, surface condensing plant and various accessories.

Harbin Tramway—The Kirin provincial authorities are reported to be negotiating with a certain American firm for the joint operation of tramway service at Harbin. The Chinese authorities will supply the sum of $2,000,000 and the American firm is to raise the balance of the necessary capital. American engineers will be employed for the laying of tramcar tracks, etc.

Tramway Combine, N.E.I.—A project is under consideration for combining the steam tramways in Java. In mentioning this matter in the N.E.I. chamber of commerce in London states that the promoters aim at working on a capital of Fl. 90,000,000, and it is suggested that British capital should be invited to participate in the formation of this group. In view of the many extensions and new lines which are planned, it should be well worth the while of British capitalists to look into this matter, since a community of interests should also connote a community of orders. The present mileage covered by steam tramways—which are in many cases railways limited as to speed—is, in the aggregate, about 2,700 miles.

The F.M.S. Electric Power Scheme.—With reference to the decision arrived at earlier in the year to provide a public electricity supply to the Federated Malay States, an electrical staff has been appointed at a cost of $150,000 for salaries and expenses, and ten engineers, surveyors and draughtsmen appointed. The preliminary survey by the government electrical adviser calls for an expenditure of approxiately $40,000.000. As the scheme matures the great facilities it will afford industrial development are being appreciated. This is particularly the case as regards tin mining.

F.M.S. Electric Board.—The director of public works, the general manager of railways, and the senior warden of mines have been appointed to constitute a board for the supervision of all schemes for electric lighting and electric supply throughout the Federated Malay States. Generating stations are to be formed near Taiping, Ipoh, Serembar, and Kuala Lumpur. Each town is to have its own station, but will be connected with Kuala Lumpur for emergency. Mr. J. C. M. Matthews, electrical engineer, Selangor, is secretary to the board.

New Electric Manufacturing Co.—The inaugural shareholders' meeting of the company recently organized by Messrs. Tso Yu-lin and Chang Tsung-hsiang for the manufacture of electric apparatus, will be held on November 20 at the Lunghai railway bureau, Tunghua Men.

New Electric Light Plant, Chinghai.—An electric light plant is being organized in Ching-hai, Chekiang, by Messrs. Wang Ying-kwan, Kuan Hwei-tsing and Hwang Guai-ching, and a suitable site, covering about three *mow*, has been purchased.

New Electric Light Plant.—Mr. Hung, a wealthy merchant of Shanghai, is planning the organization of an electric light plant at Shih-nee-yue, a prosperous town opposite Chinkiang.

Electric Plant, Nantungchow.—The Nantungchow electric plant which has been under organization by the Nantungchow municipal council with a capital of $1,400,000 is approaching completion. Boiler and machinery ordered have arrived and will be completely installed within the year, and operation of the plant is expected to begin in January, 1922.

Sino-Japanese Electric Concern, Manchuria.—The Mukden-Fushun Electric Supply Co., a new Sino-Japanese firm, has made considerable headway in its organization and operation is expected to begin in the middle of November.

Electric Light Plant for Weihsien.—Subscriptions have been raised among the gentry of Weihsien and Fengtze (Shantung) for the purpose of installing an electric light plant for these two districts. Land has been purchased, premises erected and machinery ordered from abroad.

New Electric Company Organized, China.—The Yungting Hydro-Electric Company (永電公司定水) organized by Yu Yue-tang (余幼唐) petitioned the ministry of agriculture and commerce and the ministry of communications for registration.

New Japanese Electric Scheme.—Applications have been addressed to the Japanese department of communication by nine electric companies for permission to employ the waters of the Tenryu river, which flows into the bay of Totomi through Nagano and Shizuoka provinces, according to the *Japan Chronicle*. As a consequence it has been decided that the applicants should amalgamate with a capitalization of Y.50,000,000 (about ($25,000,000). Petitions so far received include schemes which will generate 200,000 kilowatts in all.

Tokyo-Kobe Electric Line.—The electrification committee in the government railways of Japan is considering the electrifying of the Tokyo-Kobe Trunk Line which has been nearly completed by its subdivisions. But opinion obtains that this plan will not be pushed further and that the realization of it will be postponed indefinitely.

How and when the trunk line is to be electrified has been studied minutely by three divisions of the electrification committee. Two of them have been studying from the angles of construction and traffic. The other has studied it from the angle of expenditure. Their work is completed and it is understood that it will be boiled down into a definite program within this week.

At a general meeting of the whole committee in November it will be decided if the program thus drafted will be referred to the diet in winter session or if its realization will be started in the financial year 1922/1923.

Opinion, however, obtains among the well informed that to obtain the credit necessary for the

carrying out of the new program new loans must be floated. Considering the general financial policy of the administration next year it will be difficult for the government railways of Japan to plan any new issues. The new plan also will be attacked by the house of peers in connection with the vexed gauge quesiton. Therefore, the government railways of Japan will have to postpone the carrying out of the plan, if it be ready, it is believed.

Peitaiho Hydro-Electric Plant.—Permission has been conceded to Chen Chi-chien for the establishment of a hydro-electric plant at Peitaiho.

Electric Light Plant, Kiahsin.—The Tsung Sing Electric Light Company has been organized with a capital of $25,000 to operate a plant at Sin Chen, Kiahsin.

New Electric Companies Registered.—The Chusan Electric Light Company, Chusan, Chekiang; the Paoting Electric Company, at Paotingfu, Chihli; under promotion; in Tai Hsin, Kiangsu; in Shih Er-yu, opposite Chinkiang, Kiangsu.

Electricity Plant, China.—Chen Pei-jen, Chu Chen-mu, Kiang Yun-shih and Shen Wei-kun have organized the Tsung Sing Electric Company at Sin Chen, Kiahsin, with a capital of $25,000. Machines and plants are now being installed.

Peitaiho to have Electric Light.—Chu Chi-chien is promoting a company to be known as the "Peitaiho Hydraulic Electric Power Co., Ltd.," sanctioned by the ministry of agriculture and commerce.

New Chief of Tokyo Electrical Bureau.—Dr. Hanpei Nagao has been appointed chief of the Tokyo electrical bureau. A grant of one hundred thousand yen was made to Mr. Inouye, retiring chief of the bureau.

Electric Light Plants in Chong-Doo and Kai-Yuan.—The electric light plant in Chong-doo, Fengtien, has been completely organized and will begin to supply current on November 14, 1921. With a view to extending its activities to the neighboring district, the new company has sent a representative Mr. Kao Hua-wu to approach the magistrate of Kai-yuan, Fengtien, asking for permission to establish a branch in his city. The matter is now under consideration of the magistrate.

Hydro-Electricity in Rombay.—A list of places investigated or chosen for investigation is given below :—

Projects for which detailed surveys have been in hand during 1920-1921 :—Karjan River project, Rajpipla state; The Dangs projects (5 separate schemes); Tapti River Project (Bhusaval); Pravara River (Bhandardara); Urmodi River (Satara district); Kalinadi River (Kanara District).

Projects for which preliminary investigations only have been made :—Mahi and Panama rivers in Guzerat; The Tapti River at Raygad; The Nira River (Bhatghar); The Venna River (Mahableshwar); The Tattihalli, Kaveri, Badti, Sonda and Tadri rivers and the Bena Nalla in the Kanara district.

Hydro-Electric Plant, P. I.—The electrical equipment trade of the Philippines will be enormously increased by a scheme to provide lighting and power to the provinces of Bataan and Pampanga. The hydro-electric power plant will also enable important magnetic iron ore deposits to be exploited.

Transmission of Electric Power, Manchuria.—The work of establishing a system of transmitting electric power from Fushun to Fengtien (Mukden) is in fair progress, and the new system will be opened to operation by about the middle of November.

Net Work of Dairen and Suburban Electricity Systems.—The new work of the Dairen city and suburban electricity systems is expanding with the growth of the city.

On the forthcoming completion of power house No. 2 at South Shakako, capable of generating 5,000 kilowatts, conjointly with power house No. 1 at Hama-cho, Dairen, which has had its original capacity of 4,500 kilowatts increased by 1,500 kilowatts to 6,000 kilowatts, the total power available will amount to 110,000 kilowatts.

About the same time, transforming stations are to be newly re-erected at (1) Nagato-cho, Dairen, where the tramcar barn is located, (2) behind the Shakako Shrine and (3) at Tafangshen (the station south of Chinchou and next but one north of Dairen) having the respective capacities of 6,000 kilowatts, 3,000 kilowatts and 300 kilowatts. Moreover, the present transforming station at Shakako (Shahokou) of 1,500 kilowatts is to be enlarged by 1,000 kilowatts.

When these transforming stations are completed, the distribution systems will be reorganized.

The transforming station at Nagato-cho, deriving its power from both power houses, is to look after the whole city of Dairen. Shakako and Shotoku-gai will be served by the station behind the Shakako Shrine. The one at Tafangshen is to supply chiefly the new wireless station now nearing completion at Liushutun, what may be left being furnished to Chinchou.

Electrical Development in the F. M. S.—The newly-formed electricity board in the Federated Malay States is to undertake immediately the construction o: generating stations at Kuala-Lumpur, Ipoh, Taiping and Serembar.

Hongkong's Electricity, Permission to Increase Voltage.—It is notified in the government *Gazette* that permission has been given to The Hongkong Electric Company, Limited, to increase the voltage of their supply from 100 to 200 volts upon the following conditions:—

(1) The change to be carried into effect without any expense whatsoever to the consumers.
(2) New lamps to be supplied, and all fans, motors and heating appliances re-wound free of cost to the consumers, and full efficiency after such change to be guaranteed.
(3) All consumers' wires to be tested for insulation, and any leakage not to exceed ten thousand ohms (10,000 ohms). In the event of leakage being found to reach or to exceed 10,000 ohms, any alterations or repairs necessary to bring the leakage below this quantity to be carried out by the Hongkong Electric Company, Limited, free of cost to the consumers.

Development of Water Power in the Netherlands Indies.—The Netherlands Indies water power and electricity bureau has published particulars of the development of water power in the N.E.I. The electrification of the railways by power to be generated in the stations which have been built among the hills is being fully considered, and estimates have been prepared showing that a saving of at least 10 per cent. on present charges would follow the substitution of electricity for coal.

By now, a great number of power stations have been built on the swiftest and largest of the East Indies rivers, and the suggestion is that the installation of the latest types of turbo-generators would provide sufficient current to supply power to the railways. Detailed calculations clearly indicate the great savings to be effected in cost of fuel and upkeep after providing 7 per cent. for the capital invested. Private industries would also benefit substantially.

A water-power register is being compiled and enquiries are being instituted in districts where potential power exists. Tables have also been drawn up and statistics prepared of all streams developing over 1,000-h.p., not only in Java but also in Sumatra, Borneo and Celebes. There are now under state control stations developing something like 2,000,000-h.p., of which about 300,000-h.p. is in Java.

Private Lighting Plant, Peking.—The ministry of the interior has installed a dynamo from Teh Chong & Co., Tientsin, for its private use.

Electric Light Plant, Anhwei.—A certain Mr. Chong is planning to erect a small electric light plant capable of supplying current to 400 lamps at Hu-lichee in Ningkvo, Anhwei, with a capital of $8,000.

Electric Light P.ant, Ching-hai.—The Ming-ming Electric Light Plant at East Gate of Ching-hai, Chekiang, organized by Mr. Wang Yin-kwan, a wealthy merchant, will be ready to operate sometime in December 1921.

Water and Electric Supply, Peitaiho.—The Water and Electric Supply Co. at Peitaiho proposed by Mr. Chu Chi-chien is now under consideration of the ministry of agriculture and commerce.

Lungkow Electric Light Plant.—The organization of an electric light company is on foot at Lungkow which is gradually becoming an industrial centre in Shantung.

The Diamond Mountain Water Power Company, Japan, has just paid a half-yearly dividend of 8 per cent per annum. The company will henceforth supply electric light and power to the districts along which the company's light railway runs. The sale of electric apparatus and machinery also will be undertaken.

Electric Clocks, Hankow.—The Hankow *British Municipal Gazette* states that electric impulse clocks, supplied by the Hankow Light and Power Co., Ltd., are to be installed at the Municipal Offices, the fire station and the British school.

Hydro-Electric Power Systems, New Zealand.—The high commissioner for the dominion of New Zealand in London has called attention to the following statement of the minister of public works, presented to the New Zealand parliament last year, in reference to the economical distribution of hydro-electric power in New Zealand :—The estimates for 1918 for the North Island system (16,000-h.p.) amounted to £7,303,402. At the present enhanced cost of labor and material this will considerably exceed £10,000,000, and the South Island system will probably cost almost as much.

FINANCE

BANKS, EXCHANGES, ETC.

New Exchange, Shanghai.—Another new exchange known as 'The Shanghai Evening Stock and Produce Exchange Co., Ltd.' is being organized in Shanghai. The company is to be capitalized at $1,000,000 to be divided into 100,000 shares of $10 each.

Exchange in Kashing.—It is reported that the Kashing Cereals Exchange is being organized by Mr. Chiang Shih-fong, with a capital of $100,000.

Exchange, Harbin.—It is reported that the Agricultural Trust Co. of Harbin has been reorganized as a stock and produce exchange with its capital increased to $10,000,000.

New Bank, Fukien.—Many money exchangers in Nan-dan, Fukien, are planning the organization of an industrial and commercial bank with a capital of $1,000,000.

Two New Banks, Foochow.—The Chih Pai Bank which has been registered with the ministry of agriculture and commerce, will be officially opened at the beginning of November. The new bank is capitalized at $500,000 and its manager is Mr. Kung Ming-chung.

A branch office of the Hua Nan Bank will be soon formed in Foochow, a suitable site having been secured.

A New Bank, Shanghai.—The Nanyang Banking Corporation is being organized in Shanghai with a capital of $1,000,000 by Messrs. Kao Lan-wen, Tso Sin-tze, Woo Sien-koo and Kao Sze-when

Mercantile Bank Note Issue.—Notice is given in the *Government Gazette* that the Mercantile Bank of India, Limited, intends to apply to the legislative council of Hongkong for a bill to extend for a further period the powers granted by the Mercantile Bank Note Issue Ordinance, 1911, to the Mercantile Bank of India, Limited, to make, issue, re-issue and circulate notes in the Colony.

The objects and reasons state: The Mercantile Bank Note Issue Ordinance, 1911, empowered the Mercantile Bank of India, Limited, to make, issue, re-issue and circulate bank notes. This power was limited to a period of 10 years from the commencement of the ordinance. It is now considered desirable to extend this period which expires on the 28th December, 1921.

$20,000,000 Exchange, Shanghai.—The Chinese newspapers contain the prospectus of the International Gold and Silver Currency Stock and Produce Exchange. Ltd.—an institution which will apparently rank larger than all others so far established. According to the prospectus the capital is $20,000,000, in 400,000 shares of $50 each, of which $15 is to be called up, making a paid-up capital of $6,000,000. Mr. Chu Lai-fong is at the head of the concern, which is registered at the Italian Consulate. Its international character is seen in the shareholders of many nationalities who are already interested.

Native Bank Note Menace.—In view of the danger to the financial world arising from the fact that many Chinese banks have been given a charter by the Peking government to issue notes, a large quantity of which have already been dumped in the local market, the Shanghai Foreign Bankers Association held a meeting recently and it was resolved that hereafter all drafts on native banks and shops to the amount of $1,000 and those on local banks, both foreign and Chinese, should be paid in silver dollars. The regulation, it reported, will be put in force immediately.

China Flour Exchange.—The opening of the China Flour Exchange, Ltd., will take place at Nos. 89 and 91 Rue Montauban, Shanghai, on November 21. The new exchange has a capital of $1,000,000, half of which is said to have already been paid up.

Harbin Bank, Ltd.—The first installment of the shares of the Harbin Bank, Ltd., has been completely subscribed, and the founders' general meeting is to be held shortly.

The opening of the new Bank to business will take place about the middle of November.

Harbin Exchange Project.—Tde allocation of the shares of the proposed Harbin exchange is said to have been made as follows: 16,000 shares about Tokyo and Osaka; 12,000 about Dairen; about 8,000 for Seoul, Antung, Kirin and along the S. M. Railways; 10,000 for Harbin; totalling 46,000 shares.

In addition, over 30,000 shares have been distributed amongst the supporters at different places.

New Exchange, Shanghai.—There are another two new exchange under organization in Shanghai —The Bean Exchange of Shanghai, with a capital of $1,000,000 divided into 50,000 shares of $20 each, and the Shanghai Evening Stock and Produce Exchange with a capital of $1,000,000, divided into 100,000 shares of $10 each.

Tung Yih Bank, Shanghai.—The Tung Yih Bank, at 36 Avenue Edward VII, Shanghai, was opened on November 1, 1921. It is capitalized at $3,000,000 and has a branch office at Tientsin. Mr. Shen Chung-hao is general manager.

Exchange, Harbin.—The re-organization of the Harbin Agricultural Trust Company into an Exchange with a capital of $10,000,000, as previously reported, has been carried on under the direction of Mr. Sun Tien-sun, manager of China's Commercial Trust Company of Shanghai, who has just returned to Shanghai after making arrangements for its inauguration.

Washing Trust Company.—Re-organization of Washing Trust Co., Ltd as the Washing Trading Co., Ltd. has been announced with a new capital of $1,000,000 in 50,000 shares of $20 each.

A New Bank in Peking.—Mr. Chang Yung with several other capitalists is establishing the Tseng Yih Bank in Peking with a capital of $500,000.

Sino-Scandinavian Bank.—The inaugural meeting of the Sino-Scandinavian Banking Corporation, Limited, took place in Peking on the 1st instant. Chiang Tien-to, former acting minister of agriculture and commerce, was elected president, and Mr. Harold Skappel, the principal promoter on the Norwegian side, and Mr. Chow Hsiang-cheng, a director of the bureau of industry in Canton, were elected vice-presidents.

Branches will be opened at Shanghai, Hongkong and Canton at the same time. The establishment of further branches will shortly take place in Europe, principally in Norway, and in America.

A New Bank Registered.—The ministry of finance has granted registration to the National Commercial and Savings Bank organized by Mr. Sze Lien-yuan.

New Bank, Hankow.—A branch office of the Bank of Agriculture and Commerce will be soon established in Hankow.

New Exchange, Tsinan.—Mr. Li Kuo-ching has applied to the ministry of agriculture and commerce for permission to organize a coal exchange at Tsinan.

Two New Exchanges, Shanghai.—The Great China Produce and Stock Exchange, Ltd. and the Dah Kung Ping Stock and Produce Exchange, Ltd. are being organized in Shanghai with a capital of $500,000 and $1,200,000 respectively.

New Bank Opens, Shanghai.—Nearly $1,500,000 in deposits were reported for the opening day of the Industrial and Commercial Bank's new branch at 51 Kiangse Road. Headquarters of the bank, which is capitalized for Hongkong $5,000,000, are in Hongkong and the local officials are manager, Mr. Chu Kiu-how; sub-manager, Mr. Bin Yuan-chu; accountant, Mr. William K. Luke, and sub-accountant, Mr. Tu The-chuen.

A New Shanghai Bank.—The Shanghai Industrial Banking Corporation was opened up to business at No. 17-18 Kiukiang Road. The new bank has a capital of $750,000, all of which has been paid up. Mr. Li Jui-chiu is chairman of the board of directors, and Mr. Sung Koei-nien is manager.

New Banks, Shanghai, October.—Wai Ming Commercial Savings Bank: Nanyang Banking Corporation, capital $1,000,000, promoter Kao Lao-wen.

New American Bank at Harbin.—Telegrams from Moscow report that an American bank with a capital of $10,000,000, has been established at Harbin and will open branches at Chita, Blagoveschensk and Habarovsk. The bank has been constituted for the purpose of financing American business men's operations in Soviet Siberia, where an American group holds a concession for gold mines in the Amur district.—*Reuter.*

New Chinese Bank Notes.—A new issue of $5 and $10 bank notes, engraved by the American Bank Note Company of New York, is to be put in circulation by the Commercial Bank of China to replace the present issue of the same denominations.

Banking Enterprise in Outports.—Mr. Shiao Kwang-yue of Kin-an, Kiangsi, with eight other capitalists, is organizing the Salt Industrial Bank in that city. The new organization is capitalized at $1,000,000, of which $500,000 has already been subscribed.

In Fukien, there are three new banks under organization:—The May Foong Bank, an American firm, with a capital of $1,000,000 at Kwan-ying-tsin, the Territorial Development Banking Corporation at Shang-hong-chiar and the Agricultural and Commercial Bank of Ting-chong prefecture at Ding-wei-nan Road.

In Szechuan, the Agricultural and Commercial Bank of Yung Ning prefecture is also being established under auspices of the taoyin. It has a capitalization of $100,000 in 10,000 shares of $10 each and many of gentry in this district are participating in the undertaking.

New American Bank in Project.—A group of American capitalists is planning to found shortly a bank on the capital of G.$9,000,000 as a trading medium for trans-Baikalia and Amur provinces.

On its prospective establishment, the head office will be located at Harbin, and branch office at Chita and Habarovsk.

The new bank is to engage in the supply of stores to the Russia Far East, and also in the export of raw materials from Russia.

Mining Bank, Manchuria.—A plan is on foot for the organization of a bank to finance the development of mining in Manchuria. It will have a capitalization of $1,000,000. Many high officials are said to take part in the enterprise.

FINANCE

GOVERNMENT LOANS, ETC.

Canadian Loan to China.—The *Times* Peking correspondent in a recent cable announced that important issues had been raised owing to a loan under an agreement recently signed whereby a Canadian banking syndicate lends China 3,000,000 gold dollars for one year at an effective rate of twenty per cent., secured by salt surpluses. It is pointed out that an international consortium including Britain has largely aimed at preventing such loans. Britain's, American, French and Japan associates will naturally take the view if the loan goes through that the British government subscribes one policy with its right hand but a totally different policy with its left. The question asked is whether the consortium will be binding on Britain if banks in a British dominion can ignore the obligations of the British government.

Hard Times in Peking.—Through the mediartion of Li Shu-hsun, superintendent of the Tientsin customs, the Peking government has concluded a loan with the Fu Chung Company for $3,000,000 at 91 and at 18 per cent. interest with the salt surplus to be collected from October, 1922 as security. The amount of $300,000 per mensem is to be released from the salt revenue as from October, 1922 for payment of the capital sum. One year's interest has already been deducted from the loan. One-third of the loan is paid in cash, the balance in promissory note. The time limit is fixed for two years. It is stipulated that in case the salt surplus should be held up by the provincial authorities or not forthcoming for whatever reason, the buildings of the Kuowuyuan and the ministry of finance are to be pledged as securities for the loan.—*Canton Times.*

More New Banknotes.—The Chinese Republican Bank, organized by Dr. Sun Yat-sen, has twelve branch offices at present and has decided to issue paper notes, of $1, $5, $10, and $100, to a total amount of $40,000,000 which has been ordered to be printed at a Chinese printing office.

New Bank of China Stock.—New stock to the value of seven million dollars (Mexican) is to be issued soon by the Bank of China, it is learned on good authority. The shares will be placed on the market at a par value of $100 (Mexican) each, which is expected to cause a drop in the price of share already issued, now being quoted at $106 (Mexican).

Hongkong Deficit.—Introducing the budget for 1922 in the legislative council, the governor said

in the course of a speech that that the revenue was estimated at $17,276,260 and expenditure $20,207,980.

The excess was due solely to the very large program of public works.

Conclusion of Small Loan Reported.—According to reports emanating from Chinese side, the ministry of finance detailed a certain Kao to Shanghai and raised $100,000 from a local Chinese bank to tide over the political situation.

Chinese Eastern Railway, Loan.—A loan of $35,000,000 (Mexican) for the reorganization of the Chinese Eastern Railway is being sought, according to fairly authentic reports. The Chinese Banking group is said to be negotiating with General Sung Hsiao-lien for the loan. It would bear 12 per cent. and be secured by the earnings of the railway, but would not be discounted.

Vladivostok Seeks Loan.—A telegram from Vladivostok, dated November 4, states :—"It is true that a representative of the Watanabe Joint-Stock Company, of Osaka, has discussed with the Vladivostok government, at the latter's request, a proposed loan of Y.20,000,000 with the Ussuri Railway as security. Complicated circumstances involve the Chinese Eastern Railway, and it seems unlikely that the proposed loan will be made.

Another telegram from Vladivostok says that Japanese timber merchants, who last spring secured rights to cut down forests from the Vladivostok government, have requested that payment of bargain money of Y.500,000 for the present term, be postponed until after consideration of the progress of the Russo-Japanese negotiations at Dairen.—*Eastern News Agency.*

Chinese Banks May Pay Loans of Chicago Bank.—The foreign office, Peking, has issued an official statement that it is negotiating with a probably favorable outcome with the Chinese bankers group for a loan to repay both the principal and interest of the two American loans obtained through the Continental and Commercial Bank of Chicago whose representative, Mr. John J. Abbott, has been pressing the government for payment.

These two loans amount to $11,000,000 and it is now understood that the Chinese bankers group has agreed to underwrite the new loans providing the government will maintain the wine and tobacco revenues free from any obligations.

INDUSTRIAL

Trench-Digging Machinery, Formosa.—An enquiry concerning the possibilities of American trench-digging machinery for use on the sugar plantations of Taiwan has been forwarded to the commerce development by Consul Hitchcock at Taihoku, Taiwan.

Canning Factories, Philippines.—It is reported that two Californian fruit and fish canning concerns are investigating the possibilities of establishing factories in the Philippines. Plans are also in hand by a company established in Manila Bay for canning pineapples and mangoes, to include fish in its scope of operations. The outlook for such ventures in the Philippines appears propitious, as the soil conditions favor many descriptions of fruit cultivation, and nearly a million cases of canned fruits are annually imported, whilst fish and fish products are among the ten largest items of imports.

Spelter Plant Contract, Indo-Chine.—Wm. Johnson and Sons (Leeds), Limited, have received a contract for the supply of a complete plant of machinery for the manufacture of retorts, condensers, etc., in connection with a new spelter works which is being installed by a continental firm in Indo-Chine. The plant consists of grinding, screening, measuring, mixing and pugging machinery for the various kinds of refractory clays, chamotts, etc., and a hydraulic press with its pump, accumulator and accessories for the production of the retorts.

Chinese Machinery Company.—The Hsin Yeh Machinery Co., Ltd., Peking, is to be established with a paid-up capital of $150,000. It will specialize in the manufacture of screws, bolts and tools. A site occupying an area of 24 *mow* has been purchased at Mentaokow, Peking.

New Flour Mill, Changchun.—The Changchun factory of the new China Flour Mil having completed all preparations, the trial operation of the machinery was conducted on October 20. The management proposes to start work shortly, using new wheat purchased from about Harbin.

New Cigarette Factory.—The Nanyang Brothers Tobacco Company, Ltd. has purchased a new site covering over 20 *mow* of land at Yangtzepoo for the erection of a new factory. The plans and specification are under preparation, and the new building is expected to be comp eted in the course of a year.

Paper Mill, Kirin.—The Paper Mill at Kirin, the joint concern of ex-Governor Pao and Okura & Co., has been sanctioned by the central government and duly financed on the Japanese side so that it should soon commence operations. There ought to be no lack of pulp for it for Messrs. Okura & Co. have the local timber trade in their hands.

New Beet Sugar Factory.—The South Manchuria Sugar Refining Company at Mukden, which has paid a 10 per cent. dividend this year, is raising Yen 3,000,000 in debentures to found a branch refinery at Tiehling.

Largest Factory Silk Mill.—The Wai Chen Silk Textile Manufacturing Company of Hangchow, is having its new mill built at the west gate of Kashing.

New Factory, Shanghai.—A new cotton yarn cylindric holder works is being organized in Shanghai by Japanese interests. The factory is situated on Ward Road, close to the Tung Hua Cotton Mill No. 1.

Cotton and Yarn Mill, Hangchow.—Messrs. Woo Kuo-hsiang and Hus Yung-shou are organizing a cotton and yarn mill at Hangchow.

Fishery Company, Tientsin.—A large fishery company is being organized in Tientsin by Messrs. Chang Ping-doo and Sun Tsing-ching with a capital of $200,000. A steam trawler has been ordered from Japan.

Japanese Fishery Co., Tsingtao.—Mr. Getijents (?) a Japanese, has established the Yue-ming Fishery Corporation of Pai-Hai and Yellow Sea at Tsingtao with a capital of $500,000. Branch offices are also organized at Dairen and Hai-chow.

New Silk Mills, Huchow.—Three silk mills electrically operated have been simultaneously opened in Huchow, Chekiang.

Machine Tool and Boiler Makers.—The Tanikawa Iron Works have established themselves at 181 Shinchitose-cho, Nishiku, Osaka. Manager, Mr. Yasugi Nishimura.

Pencils now made in China.—The China Pencil Manufacturing Company (中 國 筆 公 司) located in Chinkiang, Kiangsu, was established with a capital of $100,000, ninety per cent. of which was subscribed by Chinese and the rest by British merchants. It is equipped with Japanese machinery, and is capable of turning out about 1,200 dozen pencils daily. The graphite used for manufacture is of local production and of very good quality.—*Yih Shih Pao.*

A Hat Making Concern.—A new industry is developing in Ningpo which may have far-reaching commercial possibilities. Imitation panama hats for both men and women are being woven from straw grown in the vicinity of Ningpo or imported from Formosa and Manila. Also ladies' hats are being woven from wood shavings as well as from various types of straws. This industry differs from the strawbraid which developed in Shantung province in that there the entire hat is produced, in some cases in fanciful designs. The producers of these hats have to watch the style trend in European and American markets so that their hat shapes conform to the latest fashions.

Matches.—The Shui Hua Match Manufacturing Co., Ltd., of Hankow, was organized in 1917 with a capital of $200,000. Its employees number 400 and the output is mostly sent to Yochow and Ichang for consumption. The recent fighting in Yochow and Ichang has caused such a tremendous loss to the company that the firm is now in liquidation and operations are entirely suspended. —*Yih Shih Pao.*

Nanchang Mint.—The civil and military governors of Kiangsi have jointly appointed Mr. Sung Tseng-ling as commissioner to restore to its former state and reopen the Nanchang Mint. As a greater part of the old machinery is damaged, a new set has been ordered from Pei-dan Co., Hankow, at a cost of about $80,000 and representatives have also been sent to Dung-ling and Van-chong, Anhwei, to purchase copper in quantity for coinage. It is reported that, up to present, a fund of $200,000 has been raised.

Weaving Factory, Ningpo.—Messrs. Han Tze-fan, Han Ching-dao, Yuo Fan-chong and Chao Mai-ting are organizing a weaving factory at Ling-yang village, Ningpo, with a capital of $10,000. The new factory is to manufacture cloth, towel and hosiery and looms and weaving machines are being ordered from Shanghai.

Rice Husking Mills, Wuhu.—In addition to the seven rice husking mills in operation, two new factories are under organization in Wuhu. The one named Tai Lay Hung is established by Mr. Chow Hai-chien with a capital of $200,000 and will be formally opened on November 15, while the other capitalized at $160,000 will operate with six second-hand machines which cost Tls. 9,000.

New Textile Mill, Nantungchow.—The Kiu An Cotton Spinning and Weaving Factory, Nantungchow, will be formally operated on November 13, 1921. The promoter of the new organization is Mr. Nyen Shih-jen.

Sun-Men-Wan Fishery Co.—Permission for the organization of San-Men-Wan Fishery Co., Chekiang, promoted by a rich Chinese oversea, Mr. Ling, has been granted by the provincial authorities of Chekiang, and a temporary office has been established at Shanghai.

Needle Factory, Tsinan.—In is reported that the Foong Hua Needle Manufacturing Co. has been established at Tsinan, Shantung. Mr. H[illegible] Chen-I is general manager and Mr. Wen Tso-shan assistant manager.

Proposed Cement Plant, Chu-Yung.—A cement plant is being organized at Chu-yung, Kiangsu, with a capital of Tls. 500,000 in 50 shares of Tls. 10,000 each. Application for registration has been made to the ministry of agriculture and commerce.

Flour Mill, Manchuria.—The flour mill at Sun-chiar-tan, Manchuria, has erected a new five-story building for its factory and purchased new American machinery costing Y.150,000 with a daily producing capacity of 3,000 bags. The factory is capitalized at $1,000,000 Mukden currency and is expected to start operation at the end of this year.

A Large Tobacco Factory in Manchuria.—The Three Eastern Provinces Tobacco Co. is being organized at Mukden by Messrs. Lu Chung-shee, Dan Shu-ming, Chang Vee-sung, Hsu Kwan-shan, Ma Wen-nyen, etc. The factory is to be capitalized at $1,000,000 Mukden currency in 20,000 shares of $50 each and one half of the amount has been subscribed by the promoters.

New Industrial Companies.—May Shen Pape Manufacturing Co., promoter, Woo Ping-chien, Van Yuan-hsiang Woolen Goods Co., Taihu Cement Plant, capital $2,500,000; promoter, Sih Nan-ming.

Textile Mills, Tientsin.—The Hua Sing Spinning and Weaving Company has added new equipment to the Tangshan and Tsingtau Mills, and increased the capital for the operation of its Weihaiwei Mill.

Vegetable Oil Revival.—Indicating a revival of the importation of vegetable oils from the Orient through Seattle, the Union Pacific System on October 12, dispatched the first transcontinental solid train-load of bulk cocoanut oil to move through Seattle in two years, to eastern manufacturing points. The shipment reached Seattle October 12, from the Philippines on the Blue Funnel steamship *Talthybius* and at 6.45 on the evening of October 13 the long train pulled out. Seattle has tankage equipment for more than 12,000,000 gallons of Oriental oil.

Extension of Java Sugar Mills.—It has been estimated that owing to lack of repairs and extensions during the war, at least 70 per cent. of Java's sugar mills will have to be replaced during the next few years.

Government Gas Monopoly.—That the Japanese government may monopolize the gas industry appears probable. A bill providing for the step has been drafted and will be introduced at the next session of the Diet. The recent municipal scandal in Tokyo instigated the agitation for municipalization of all gas enterprises.

Under the terms of the proposed new law all private gas enterprises would be compelled to have government sanction in order to operate.

That the bill is certain to create a furore when it is introduced is the belief of persons who are well informed as to the situation. The private gas interests in the empire are already mapping out a plan of campaign against the measure, it is understood.

New Fishery Company.—Establishment of a fishery company at Tientsin with a capital of $500,000 is being contemplated by Sun Tzu-wen, industrial commissioner of the province of Chihli; Yen Hsui, Hsu Ming-hsuan and Chao Yu-mei.

Honolulu Iron Works, Philippines.—C. Hedemann, vice-president and technical director of the Honolulu Iron Works, is now in the Philippines to inspect the newly-completed sugar machinery plant which cost in the neighborhood of $500,000. This new plant is principally for the purpose of taking care of repairs to sugar mill machinery that otherwise would be diverted to Hongkong, there being up to this time no repair plant of this kind in the Philippines. While the Manila plant is capable of constructing a complete mill, if necessary, it is not believed that it will interfere seriously with the manufacture of mill machinery for the Philippines that has heretofore been done at Honolulu.

New Cement Plant, P.I.—Mr. Charles F. Massey, chairman of the board of directors of the Massey Concrete Products Corporation of Chicago, one of the largest producers of cement in the United States, says that the work on a huge cement plant to be erected at Cebu, will require at least a year and its completion would mark the initiation of a vigorous entry into the cement markets of the Far East.

Fire Engines, Peking.—Two additional fire brigades, consisting of 120 men each, will be added to the six fire brigades now protecting Peking.

Japanese Investments in Tsingtao.—Japans' industrial investments in Tsingtao and along the Shantung railway zone total approximately $800,000 (Mexican), according to the *Minkuo News Agency*. Much factories, cotton mills, flour mills and silk yards are listed as among the most important industries. There are 145 industrial plants, most of which have been established in the last three years.

Japanese Industry in Mongolia.—The Japanese are said to have induced the Mongolia princes to permit them to open the mines and construct railways in Outer Mongolia. They have also established many factories in South Urga and are trying to develop their industry and commerce there. —*Chen Pao.*

Large British Pump Contract, China.—Among recent contracts secured in China are several large pumping installations supplied by Messrs. W. H. Allen Sons & Co., Ltd., Bedford (through their agents, Messrs. Scott, Harding & Co., of Shanghai). These consist of seven sets of electrically driven centrifugal pumps, each set capable of delivering 27,500,000 gallons per 24 hours against a head of 40-ft. coupled direct to 350 h.p. motors; two sets delivering 4,320,000 gallons against a head of 110-ft.; one set delivering 8,640,000 gallons against a head of 140-ft.; and two h.p. motors; two sets delivering 4,320,000 gallons against a head of 40-ft. coupled direct to 350 sers, boilers, etc.

Japanese Silk and Cotton Plant Under Construction.—Construction of a large Japanese silk and cotton textile plant covering a site of about 800 *mow* on Ping-liang Road, Yangtzepoo, has commenced. The owners are still purchasing land in the vicinity on which to build quarters for the employees and a market for Chinese and Japanese dealers. The factory is also planning the establishment of a cotton cultivation yard in Chinese territory.

A New Sugar Refinery, China.—The Nationa Citizens' Sugar Manufacturing and Refining Company, a Chinese industrial enterprise promoted by leading Chinese capitalists and industrialists, including Chang Chien, M. Y. San and others, held an inaugural meeting recently.

Salt Refining Co.—Messrs. Shaw Shiao-gee, Tung Han-ching and Chen Sze-tao are organizing a salt refining company at Yinkow, Manchuria, with a capital of $100,000. A petition for approval and registration has been made to the salt commissioner at Manchuria and salt gabelle at Peking.

New Cotton Mill at Tangshan.—Mr. Chow Hsuan-shee, manager of the Chee Hsin Cement Plant, is establishing the Hua Sing Cotton Spinning and Weaving Factory. Building of the new mill has been completed and await arrival of machinery.

Porcelain Works, Fukien.—Mr. Hwang Tsan-fu of Chong-chow, Fukien, is planning the organization of a porcelain works at Sha-ma with a branch at Sing-yue, capital, $30,000.

China Brewery, Shanghai.—The China Beer Manufacturing Co. is being organized at Shanghai by Messrs. Chen Wen-chien, Chao Chong-yue, Tsai Yue-ngan, Chen Shih-ming and several others. It is to be capitalized at $500,000 divided into 5,000 shares of $50 each. Experienced brewers will be employed and a number of Chinese dealers in liquor and wine will act as agents of the new company.

Weaving Factory Extension, Ningpo.—In order to meet the increasing demand for its products, the Fu Sung Kee Weaving Factory at Dao-kiang, Ningpo, has ordered several additional looms from a certain iron works, Shanghai.

Military Textile Plant, Peking.—The military textile plant at Tsin-ho, Peking, now controlled by the minister of war, has improved its business since Major-General Lee Lu-sung was appointed its president. The factory specializes in weaving and dyeing woollen stuffs which besides used by the government for soldiers' uniforms are enjoying a good sale on the market.

Move For Boosting Industry of China.—For the purpose of devising means to improve Chinese industry, Mr. Yeh Kung-cho, former minister of communications and now high commissioner for industry, has despatched Mr. Hsu Chiu and Mr. Li Tseng as investigators of industry in Kiangsu, Chihli and Shantung provinces. The former is leaving for the Yangtze valley for the inspection of the Chinese products fair at Nanking and the Chinese commercial exhibition, which has been established in Shanghai by the Chinese chambers of commerce in the two cities of Kiangsu, while the latter is proceeding to Tientsin for the inspection of the Chihli industrial exhibition, which has been opened by the Tientsin Chinese chamber of commerce in the hope of improving the industrial condition of Chihli province.

New Fire Engines, Canton.—In order to meet the urgent need of fire-extinguishers in Canton, two powerful Penta fire extinguishing engines have been imported from Sweden which will be capable for operating either in the old city or on the different broad maloos. The pumps are driven by 10-12-h.p. gasoline motors capable of pumping 132 imperial gallons of water per minute to a height of 100 feet.

Machine Guns, Shanghai.—The purchase has been arranged from the British government of fourteen .303 Vickers machine guns for the Shanghai Volunteer Corps. The approximate cost of each gun complete with spare parts is £125.

Sugar Plant Completed, Hokkaido.—The Imperial Beet Sugar Company has completed the erection of its plant. It has already called up Y.12.50 of the Y.50.00 par value of its shares. To obtain working capital another call for Y.5.00 was recently made. But as the Y.12.50 paid up shares are selling at only Y.2.00 in the market, only 60 per cent. of the shareholders have paid this extra Y.5.00 assessment, and the company's operations now expressed of the feasibility of the company's plans.

Government Fuel Administration, Japan.—Foreign, war and navy department officials met in Tokyo recently to consider future plans concerning fuel supplies. Pending a preliminary decision nothing definite will be made public by the authorities, but the newspapers understand that the government has under contemplation the establishment of one large fuel storage station and the organization of a special fuel administration for investigation, experimental mining, investment and improvement regarding the possibilities of coal, oil and available substitutes. The estimates for the proposed scheme will be introduced in the forthcoming session of the diet.

Malayan Oil Mills, Kuala Lumpur, F.M.S.—The new plant and machinery has arrived and is lying at Port Swettenham. The plant is of the most up-to-date type capable of dealing not only with rubber seeds, but also with copra and groundnuts. The governments advanced the company sufficient funds to pay for this plant, but is not prepared to make any additional advance for the erection of same.

In order to install the new machinery, extend the present factory and provide working capital, a sum of $50,000 is required.

New Sawmills, B. N. Borneo.—The British Borneo Timber Company's new sawmill, now on the point of completion, is one of the most modern and fully equipped bandsaw mills in the Far East. Its success, already assured, will lead to the erection of several others in and around Sandakan where unlimited resources of the finest timber await the axe within a radius of 25 miles. It is believed that even this great mill and the North Borneo Trading Company's neighboring mill together will have difficulty in coping with the procession of logs which has already begun the journey millwards from the vast jungles fringing Sandakan's splendid harbor. Mr. Matthews, the manager with his two American mill experts, has erected and fitted this large mill, overcoming successfully the many heartbreaking obstacles and difficulties inseparable from such a task in a new country.—*B.N.B. Herald.*

A New Printing Co. Established in Shanghai.—A new printing works has been opened at Mohawk Road by Mr. Kao Tsing-ching, is proprietor of Hua Tai Printing Co. at San-mo-ko-jao. The plant is equipped with American machines and is managed by a returned student.

Soap Works, Fukien.—The May Lee Chen Soap Manufacturing Co., Fukien, is being organized.

Flour Bag Manufacturing Co. Opened.—A Flour bag mill equipped with forty weaving machines in operation has been established in Changchun, producing 1,200 bags every day.

Cloth Factory, Chekiang.—A cloth weaving factory known as Koo Yung-dah has been opened at Feng-hua, Chekiang, by Mr. Koo Mu-yung, a wealthy merchant in the city. The new factory is capitalized at $50,000 and has been equipped with eighty looms. (This undoubtedly refers to native hand looms.—*Ed.*)

Fulton Iron Works, Equipment in Java.—After making a tour of inspection of the sugar industry throughout the entire island of Cuba, Mr. L. C. M. Dongriot, of Java, D. E. I., has decided that the Fulton Iron Works, of St. Louis, Mo., U.S.A., produces the sugar mill equipment that shall be installed in his new central in Java. At the present time, one tandem consisting of three mills and double Fulton crushers, rolls of 36-in. by 84-in., will be installed in this central at Banjanhomas, Java, D. E. I., and it is proposed to have everything ready for grinding the next Java cane crop, May to November, 1922.

Netherlands East Indies Projects.—A steam laundry is to be erected at Bandoeng at a cost of a quarter of a million florins. In Java a factory has been established for the manufacture of magnetos. As this factory undertakes the repair of magnetos it should be kept well employed. Java's automobile trade is steadily growing, and there are about 16,000 cars in the island.

A Brick Factory for Sourabaya.—At Sourabaya a company has been formed with the object of building brickworks at Sepandjang in the vicinity. The new brickyard is to be provided with three sets of machinery, consisting of mills, presses, rolls and automatic cutting apparatus. Each set of these machines is to have a capacity of 4,000 bricks per hour, so that a yearly output of about 20 million bricks will be obtained. Two annular kilns are to be built, each of a capacity of 50,000 bricks daily.

Concrete Pipe and Pole Plant, Japan.—The Asano Bussan Kaisha has just purchased the rights to manufacture exclusively concrete pipes and poles from Mr. H. Siegwart of Lucerne, Switzerland, the inventor of the process and will erect a factory at Tsurumi to make them. Mr. Siegwart, who has been in Tokyo the last two months, perfected his invention some time ago after devoting 30 years of his life to working it out.

It is possible to make pipe and poles of various kinds which are more durable and economical, according to the inventor. A steel web is used, and concrete is applied in layers under high pressure.

The factory at Tsurumi is to be small at first. Work will start in the spring, and it is hoped it will be ready by the first of 1923. Mr. Siegwart will go to Switzerland on the Andre Lebon but will return to take charge of the factory and instruct the Japanese in the making of his product.—*J. A.*

MINING

Discovery of New Tin Deposit.—What promises to be a very rich piece of land with a deposit of tin containing 60 per cent. of ore has been located between the Lahat Mine and the Menglembu Lode. It is thought that the find is the biggest on record in Perak for the last fifteen years. A small Chinese basin of earth gave five catties of clean ore when washed out, and there are many large and heavy pieces of almost pure ore. It is understood that the mine will be worked immediately.

Coal Mine, Manchuria.—The coal mine at Sun-chiar-tung, Manchuria, has been opened by Mr. Liu Kan-sui. A sum of $40,000 has been collected for the undertaking.

Kirin Coal Mine.—The opening of the coal mine at Fu-shih-ling-tze, Kirin, by Mr. Chu Yue-chong with modern methods has proved to be very successful. Its daily output is over 200 tons.

Coal Mines, Siberia.—The workers have constructed a branch railway to the rich Kusnetsk coal basin region much abead of the time set for constructing this line connecting the Kelchugino station on the truck line with the town of Prokofiovo. By means of this branch line, the exploitation of vast deposits of coal can be undertaken. The energetic efforts of the workers are highly appreciated by the Siberian revolutionary committee.

Ching Ching Mines.—It is reported that the German legation has requested the Chinese government to inquire into and give a decision regarding the Ching Ching mines, which were taken over by the provincial authorities of Chihli when China declared war on Germany, and that the government has appointed Mr. Hsu Shih-kwang, director of the Ching Ching mines, and Mr. Chu Hsiang-yuan, commissioner for foreign intercourse in Chihli, to carry out a full investigation into the German claims of ownership.

Gold Strike, Kelantan.—A valuable find of gold has been made in North Kelantan, and is described as a modern Klondyke. Hitherto, it has been crudely worked by natives and Chinese, yielding two ounces per ton. Assays now show that there are twenty-nine ounces per 2,000 pounds ton. A syndicate has been formed with batteries capable of crushing thirty tons daily.

Manchuria Gold Mining Co.—Marshall Chang Tso-lin has proposed the organization of a Manchuria Gold Mining Company and is soliciting the co-operation of Chinese merchants.

Bureau of Mines Established in Kwangsi.—A bureau of mines has been established in Kwangsi in order to develop the mineral resources of that province. Mr. Wang Sam-chih, a mining expert returned from Singapore, was appointed by President Sun to the post of commissioner of the bureau. The bureau is situated in Nanning. Regulations relating to the organization of the bureau have been issued by the ministry of interior.

Sun Cheong Cries for Help.—Andersen, Meyer, & Company, an American firm at Shanghai, have discovered a precious stone mine in Honan province. The mine is said to be worth Mex.$100,000,000 and the Company has applied to the department of agriculture and commerce, Peking, for protection by the Governor of Honan province.—*Exchange.*

Chinese Coal-Mining.—Chen Chih-chi of Sintaihsien, Shantung, has raised a sum of $200,000 for the working of the Sintai Coal Mine, which is located between Lungtan and Chenlitsang. He has already applied for registration to the provincial industrial commissioner, who has submitted the application to the ministry of agriculture and commerce for official sanction. The application is now under consideration.

Mineral Output, Shantung.—The total mineral output along the Shantung railways for October, 1921, increased by 12,389 tons in coal and 200 tons in iron ore as compared with last month. In October, 1921, 24,325 tons of coal were produced at Pang-kong, Tze-chuen, 13,548 at Jih-li-chong, 8,690 at Si-kong of Fong-tze and 4,480 at Tung-kong of Fong-tze, making a total output of 51,043 tons, while the iron ore obtained from Ti-kwong-shan at King-ling-chen were 1,495 tons.

Coal Output, China.—The total output of coal throughout China in 1920 amounted to 21,300,000 tons, of which 5,500,000 tons were operated by Chinese, whereas in 1916 China produced 16,000,000 tons of which purely Chinese output were only 280 tons.

China's Mineral Resources.—For the period from 1914 to 1919 the mining permits applied for throughout China, according to the registration list of the ministry of agriculture and commerce, amounted to over 1,700,000 *mow*, not including those under investigation and recently discovered. The areas are given below in square *li* :—

Gold	76,534	sq. li.
Silver	76,555	,,
Copper	204,759	,,
Iron	205,644	,,
Tin	28,703	,,
Lead	44,093	,,
Zinc	8,093	,,
	15,703	,,
Tungsten	5,463	,,
	574	,,
Coal	2,285,775	,,
Asbestos	33,426	,,
	11	,,
Soapstone	7,592	,,
Sulphur	10,166	,,
	4,018	,,
	13,500	,,
Pottery Clay	3,500	,,
	2,018	,,
Graphite	2,500	,,
	28,222	,,
	3,249,291	sq. li.

The following is a list of mineral areas in each province of China except Kansu and Sinkiang in which no exact figures regarding mines are yet available :—

Peking Prefecture ...	314,678	sq. li.
Chihli	377,574	,,
Fengtien	373,163	,,
Kirin	229,999	,,
Heilungkiang	186,500	,,
Honan	134,185	,,
Shantung	476,739	,,
Shansi	256,241	,,
Kiangsu	70,240	,,
Kiangsi	48,277	,,
Anhwei	142,444	,,
Chekiang	46,184	,,
Fukien	35,436	,,
Hupeh	49,647	,,
Hunan	63,795	,,
Kwangtung	3,815	,,
Kwangsi	4,148	,,
Szechuan	67,350	,,
Shensi	1,000	,,
Yunnan	120,795	,,
Kansu	3,944	,,
Charhar	7,037	,,
Jehol	106,611	,,
Suiyuan	29,389	,,
	3,249,291	sq. li.

The following table gives value of the output of various mines in operation :—

Mine	Area (sq. li)	Value (in dollars)
Coal	2,286	62,320,000
Gold ...	276	3,802,000
Iron	206	15,620,000
Copper ...	205	1,342,000
Lead ...	44	1,177,000
Antimony ...	35	17,440,000
Asbestos ...	33	62,000
Tin	29	12,240,000
	28	101,000
Manganese ...	21	510,000
	16	3,000
	13	(Unknown)
Silver ...	12	38,000
Sulphur ...	10	(Unknown)
Zinc ...	8	2,314,000
Soapstone ...	7	168,000
Tungsten ..	5	26,000,000
	4	(Unknown)

Mine	Area (sq. li)	Value (in dollars)
Pottery Clay	3	(Unknown)
Graphite ...	2	(Unknown)
	2	(Unknown)
Pottery Clay	½	300,000
Graphite ...	(Unknown)	1,444,000
Alum ...	(Unknown)	1,004,000
Gypsum ...	(Unknown)	162,000
Petroleum ...	(Unknown)	8,400

Manchurian Mining.—General Chang Tso-lin is planning the organization of the three eastern provinces mining administration to explore the rich gold deposits of Manchuria. As the enterprise will require a big fund the proposed concern will probably be jointly managed by Chinese officials and merchants.

Lead Mine, Manchuria.—Mr. Chen Chi-fan has applied to the industrial commissioner at Mukden for opening the lead mine recently discovered at Lao-nue-chao in Ching-si, Fengtien.

Coal Mining Permit: Manchuria.—Mr. Wei Chung-fong has applied to the industrial commissioner at Mukden for authorization to open the coal mines at Ya-tze-chu in Si-an, Fengtien.

New Coal Mine.—The ministry of agriculture and commerce has granted Mr. Sze Chung permission to operate the coal mine at Ziar-ching in Shei-hsien, Honan, covering an area of 6 sq. *li* 331 *mow* and 5,252 sq. ft.

Sze-Hsien Coal Mining Co., Tientsin.—The Sze-hsien Coal Mining Co., Ltd. is under organization at Tientsin with a capital of $2,000,000 in 20,000 shares of $100 each. The new Company which is to be jointly managed by Chinese officials and merchants will engage in operating the coal mines of Sze-hsien and manufacturing fire-bricks and cement. For facilitating transportation, a railway from Peng-chen-ching to Kwang-lao-ching will be built connecting with the main line of Peking-Hankow railway.

Mining Permits.—The ministry of agriculture and commerce has granted Chen Gi-ming, Chow Fan-ning, Chang Tien-chu and Ling Shee-chen permission to operate coal mines at Ching-chiar-ling of Kiangpoo, Kiangsu, Dah pei-ku of Dah-dong, Shansi, Doo-ping-ching of Dah-dong, Shansi, and Kwan-ma-ling of Pang-chee, Fengtien, respectively.

Iron Deposit, China.—Discovery of a rich iron deposit in Western Chingho district, Suiyuan circuit, is reported. The Chinese owners have failed to exploit it because of lack of capital.

Coal Mine Registered.—Mr. Woo Tseng-fong has petitioned the industrial commissioner at Anking to open the coal mine discovered at Dah-foong village in Hwai-ning, Anhwei.

Jade Discovered in Honan.—A foreign mining expert has discovered a jade made in Kaochen, Honan. The value of the mine is estimated in the neighborhood of $1,000,000. The government has instructed the military governor of the province to make preparations for its future exploitation.

Coal Output in China.—According to the department of agriculture and commerce, 16 million tons of coal was mined in China, all told, in 1916, of which only 2,800,000 were excavated by Chinese, but four years later the total output was increased to 21,300,000, of which 5,400,000 tons were taken out from mines under Chinese management.

Mining Permits, China.—Fifteen certificates granting permission to open mines in China were issued by the ministry of agriculture and commerce during October. The certificates cover a total mining area of 3,040 *mow*.

Rich Tin Discovery, F.M.S.—A prospector at Perlis Caves has discovered a rich tin deposit at depth of one thousand feet. A coolie is able win nearly a picul of ore daily.

Gold Discovery, B.N.B.—Gold has been again discovered in the Tabanak river. The discover is a Chinese road contractor. He has taken out a prospector's licence and with a party is now working at the spot trying to discover the lode in the rock forming the banks of the river at this point.

Kelantan Gold Strike.—We are informed that there has been a valuable find of gold in the north of Kelantan, says the *Singapore Free Press*. This has been worked by Chinese and natives by the most crude methods for some considerable period. A syndicate was formed in Singapore to investigate this area, and three separate mining engineers have reported so favorably that the syndicate has acquired rights over a large area. The Chinese have been getting a very even 2-oz. of gold per ton ore worked by foot stamps, a most primitive and wasteful method. Samples assayed in Singapore give 29-oz. to the ton of 2,000-lb.

The syndicate will start in with modern machinery, i.e., two batteries of ten head stamps capable of crushing 30 tons each per day. If gold be obtained only in the same ratio as the Chinese obtain it, yet the return will be a most profitable and handsome one. Two stamps crushing 60 tons would obtain 120-oz. of gold per day. The working expenses will more than favorably compare with any other mining concern, as water power is available. This will eliminate the initial expenses of heavy engines and the cost of fuel. The success of the whole proposition will undoubtedly hinge on the question of machinery and working the mine, as the gold is present in sufficient quantity to start a modern Klondyke, the formation is schist and decomposed granite. The syndicate are in respect favored, as one of its members is a competent engineer with mining experience, which goes far to ensure results and to guarantee low working costs.

NEW COMPANIES

New companies, in Japan for September:

	Number	Capital
		Y.
Gas works	—	—
Spinning mills...	2	1,500,000
Weaving mills	3	450,000
Chemical works	5	2,450,000
Engineering works	2	2,100,000
Shipyards and dockyards ...	—	—
Kilns	2	3,200,000
Metal works	—	—
Comestible factories ...	14	2,900,000
Sundry works	19	15,470,000

Extension of established firms was made only in spinning, chemical, engineering, comestible and sundry other industries. Their combined capitalization was only Y.17,030,000.

Registration of New Companies, China.—The following companies have been recently registered with the ministry of agriculture and commerce :—

Yue Sung Licorice Co.

Tseng Yih Bank, established by Mr. Chang Yung.

Nanyuan Electricity Co., established by Mr. Hsing Tse-chong.

The following corporations are being promoted :

Chiao Tung Steamship Navigation Co., Ltd., Shantung.

Yao Hua Glass Manufacturing Co., Ltd., by Mr. Li Shu-teh.

China Cement Plant, Ltd., Kiangsu, by Mr. Yao Sih-chow.

Foong Hua Co., Peking.

Sing Chung Trading Co., Ltd., Peking.

The Central Trading Co., Ltd., Peking.

The following companies have been lately registered with the ministry of agriculture and commerce :—

Chow-shan Electricity Co., Chekiang.

Paoting Electric Light Plant, Chihli.

The following corporations have been registered with the ministry of agriculture and commerce :—

Woolen Goods Manufacturing Co. of Kansu.

Song Lung Steamship Navigation Co., Kiangsu.

Kiangsu-Chekiang Beewax Industrial Co.

Hanyang Electrical and Engineering Co., Ltd. by Mr. Li Chiar-shu, Hanyang, Hupeh.

Nih Shun Board Paper Manufacturing Co., Ltd., Kiangsu.

A Railway Transportation Co., Hankow.—It is announced that the Hankow Railway Transportation Trust Company has been organized by business men of Hankow with a capital of $2,000,000 in 20,000 shares. The company intends to establish branches along the more important stations of the Peking-Hankow, Tientsin-Pukow, Lunghai, Peking-Suiyuan, Peking-Mukden, Chenta and Tao-ching Railways.

NEW EXCHANGES

New Exchanges in Shanghai.—The Chinese Foreign Products and Stock Exchange Co., Ltd. is under organization at Shanghai with a capital of $2,000,000 to be divided into 100,000 shares of $20 each. Among the promoters the important are Messrs. Loh Sung-hur, Yu Wu-dan, Chao Jen-poo and Ma Chi-liang.

The Shang Yang Stock and Produce Day and Night Exchange, Ltd. is being organized at Shanghai by Messrs. Lu Shiao-chiar, Shen Chi-wang, Liu Shih-sung and Di Tsu-tsing. It is to be capitalized at $1,200,000 in 60,000 shares of $20 each.

The Great China Produce and Stock Exchange, Ltd. is under organization in Shanghai with a capital of $500,000 to be divided into 50,000 shares in $16 each.

New Exchange, Ningpo.—The Ningpo Cotton Yarn and Cloth Exchange Ltd. is being organized by Messrs. Feng Foo-tsar, Chu Lien-sung, Chen Ming-chien. Tong Wei-sui, etc., with a capital of $600,000 in 30,000 shares of $20 each.

Exchanges in Outports.—The following is a list of Exchanges organized or being organized in principal cities of China :—

Location	Name	Capital
Ningpo	Stock, Cotton & Yarn Exchange ..	$1,200,000
,,	Commercial Stock, Produce and Gold Currency Exchange	$1,200,000
,,	Cotton Exchange	—
,,	Yung Kiang Oil and Bean Exchange	—
,,	Gold and Silver Exchange	$1,200,000
Canton	Stock, Cotton & Yarn Exchange ..	$10,000,000
Swatow	Stock, Cotton & Yarn Exchange ..	$5,000,000
Hankow	Produce Exchange	—
,,	Cotton Exchange	—
,,	Stock Exchange	—
,,	Yarn Exchange	—
,,	Cereals Exchange	—
,,	Hide Exchange	—
,,	Cotton Trade Exchange	—
,,	Tea Exchange	—
,,	Hemp Exchange	—
,,	Coal Exchange	—
,,	Flour Exchange	—
,,	Oil Exchange	—
Tientsin	Stock, Cotton, Yarn, Cereals, Fur & Skin Exchange	$2,500,000
Peking	Stock, Cotton, Yarn, Cereals, Fur & Skin Exchange	—
Nanking	Stock Exchange	$200,000
Chinkiang	Stock Exchange	—
Hangchow	Paper & Tin Foil Exchange ..	$600,000
Nantungchow	Stock Exchange	—
,,	Drapery Exchange	—
,,	Cereals, Cotton, Yarn & Stock Associated Exchange	—
Soochow	Stock Exchange	—
,,	Tobacco and Wine Exchange ..	$500 000
,,	Cereals, Oil, Flour and Bean Cake Exchange	$600,000
Chinkiang	Cereals, Oil, Flour & Bean Cake Exchange	$500,000
Sungkiang	Stock Exchange	—
Wusih	Cotton Yarn & Cloth Exchange ..	$600,000
,,	Stock Exchange	$500,000
,,	Silk and Cocoon Exchange	$500,000
,,	Cereals, Oil & Bean Cake Exchange	—
Pengpu	Associated Exchange of the Stock and the Cereals & Stock Exchange	$500,000
Nanchong	Stock Exchange	—
,,	Hungtu Stock Exchange	—
Kiukiang	Stock Exchange	—
,,	Cereals & Oil Exchange	—
,,	Zingyang Stock Exchange	—
Hongkong	Chinese Stock and Produce Exch.	$5,000,000 (Hongkong Currency)
,,	Sino-Foreign Stock & Produce Ex.	$5,000,000
Tsinan	Produce, Fur and Skin Exchange	—
,,	Oil Exchange	—
,,	Cotton Exchange	—
,,	Coal Exchange	—
Nanchong	Yuechong Stock Exchange	—
Harbin	Exchange of Harbin	$10,000,000
Haimen	Cotton and Cotton Cloth Associated Exchange	—

Name	Capital	Manager or Promoter
China Export Produce and Stock Exchange	—	—
Kiangnan Stock & Produce Exch.	$500,000	Wang Ting-tseng
Asia Stock & Produce Exchange	$1,000,000	Yuan Sze-yung
Dah Dung Day & Night Stock & Produce Exchange	$500,000	Sa Tan-lee
Tung Song Stock and Produce Exchange of Shanghai	$1,200,000	Hsu Fen soo
S'hai Stock and Produce Exch ..	$1,500,000	Wang Tsu-kiu
Eastern Asia Day & Night Stock & Produce Exchange	—	—
Sino-Foreign Day & Night Stock & Produce Exchange	$1,500,000	Chen Teh-bai
Shanghai Day and Night Stock & Produce Exchange	—	—
The First Stock and Produce Exchange of Shanghai	—	—
Sing Tsai Cotton Yarn & Cloth Exchange of China and Europe	—	—
South East Day and Night Stock & Produce Exchange	—	—
Shanghai Bean Exchange ..	$1,000,000	Moh Tze-ching
Dah Tung Day and Night Stock & Produce Exchange	—	—
The Five Continents Stock and Produce Exchange of Day and Night	—	—
The Republic Day and Night Stock and Produce Exchange	—	—
Evening Stock and Produce Exchange of Shanghai	$1,000,000	Wang Deu-kiu
Dah Chung Hua Stock, Produce and Gold Currency Exchange	—	Lu Shao-chair

New Exchange, Shanghai.—The East Asia Stock and Produce Exchange Co., Ltd., is under organization at Shanghai with a capital of Tls. 1,000,000 in 50,000 shares of Tls. 20 each. Among its promoters the important are Messrs. Der Yao-ting, Ziar Tze-sung, Chu Lien-fu, Liu Kih-sun and Hsu Kwan-nan.

Tea Exchange, Shanghai.—The Shanghai Tea Exchange is under organization with a capital of $1,000,000 in 50,000 share of $20 each. The new company has been officially registered with the ministry of agriculture and commerce and Mr. Hsu Shih-ying, ex-minister of communications, is head of the organization.

New Bank, Ningpo.—The Ming Sing Bank at Dang-hong-chiar, Ningpo, was formally opened on November 12.

New Exchange, Ningpo.—The Yung Kiang Bean and Oil Exchange, Ltd., which is being organized at Ningpo by Messrs. Yuan Tuen-foo, Tso Pao-ting, Yue Fu-tan and Lee Lien-fai with a capital of $500,000 in 25,000 shares, has been officially registered with the ministry of agriculture and commerce.

Another new exchange under organization is known as the Ningpo Cotton Yarn and Cloth Exchange, Ltd., capitalized at $600,000 in 30,000 shares of $20 each. Among its promoters are Messrs. Feng Fu-tsan, Chu Lien-sun, Chen Ming-chien, Tung Wen-sui and Sun Lu-kwan.

OIL

Oil in New Guinea.—According to an article in the *Engineering and Mining Review* of Melbourne, the Anglo Persian Oil Co., which has been prospecting for oil in Papua, New Guinea, under the auspices of the Australian commonwealth government, is about to undertake the search in the territory under Australian mandate at its own expense. The grant of £50,000 made by the Australian and British governments to defray the cost of prospecting in Papua will only suffice to carry on the work for two or three months longer.

Prospecting for Oil and Minerals, Siam.—Renewed attention is being given in Siam to the discovery of petroleum in the Muang Fang and Chieng Mai districts where the government are at present carrying out experimental boring. A certain amount of private prospecting work has already been done. In regard to minerals as well as oil expectations are also entertained. Geological examination has proved the existence of iron and coal in the north-western districts, while gold, tin and antimony have also been found. Plans for more scientific methods of research are now being considered.

Oil Wells, China.—According to latest report there are 22 petroleum wells in Chihli, 4 in Fengtien, 2 in Kirin, 13 in Kweichow, 17 in Yunnan, 8 in Shensi, 5 in Kiangsu, 4 in Kwangsi, 4 in Hunan, 4 in Kiangsi, 3 in Szechuan, 2 in Hupeh and 1 in Kwangtung, making a total of 91 wells of which Chihli, Kweichow, Yunnan and Szechuan possess the best.

Oil Combine, Japan.—The Hoden Oil Company was finally amalgamated with the Nihon Oil Company on October 1, all its assets and liabilities having been taken over by the latter. The Nihon Oil Company thereby made itself the largest oil company, not only in Japan, but in the entire Orient, having a total capitalization of Y.80,000,000.

The Osaka Oil Manufacturing Company, organized recently with a capital of Y.200,000, one-half paid-up, has its offices at 314 Hiranoichi, Toseigun, Osaka. Manager, Shikazo Tsuruchi.

New Petroleum Refinery, Japan.—The Naigai Petroleum Company in which the Asano Bussan Kaisha, Mr. S. Asano, president, is heavily interested, has just been incorporated with a capitalization of Y.7,500,000. Mr. Asano was elected president with Mr. U. Hashimoto, managing-director, and Mr. R. Kono, manager.

The new Company will import 100,000 tons of Mexican crude oil a year. It will supply oil to the Imperial navy and the Tokyo Kisen Kaisha and sell the remainder to the public.

A refinery will be erected on the reclaimed ground at Tsurumi near Yokohama.

New Concession, Java.—The Netherlands Colonial Petroleum Company, which is a branch of the Standard Oil Company of New York, have obtained Sungei Bakul concession, situated in the country back of Palembang (South Sumatra). The area comprises some 3,949 hectares.

PUBLIC WORKS

Public Works, Chengtu.—The rivers in the city of Chengtu will be dredged as a first step the improvement of public works. The fund for the purpose will be created by drawing on the street and river taxes and the work will be commenced after the completion of a survey. Schemes regarding establishing a public garden and a model market, constructing a circular road around the city, laying out a tramway, repairing the city streets, improving the waterworks and electric light plant, etc., were also discussed at the meeting and definite measures for carrying out the plan were drawn up.

Hongkong Hill Contract.—The Praya East reclamation works have commenced. The tender for the removal of 'Morrison' Hill has been awarded to Chinese contractors; the work will cost over $2,700,000.

Railway Extensions and Other Facilities Provide for in the Korean Budget.—The bureau of colonies of the department of home affair at Tokyo is examining the budget estimates of the Korean government for the next fiscal year, which were recently submitted by Mr. Kochiyama, director of the bureau of financial affairs, now on a visit to Tokyo. Compared with the budget for the present year, the figures are an increase of about Y.30,000,000. This is due mainly to the new undertakings which the government has decided upon.

The Korean government proposes to establish at least one middle school in each of the provinces. This arrangement is necessitated by the rapid development of education among the Koreans and by the marked improvement in their cultural life. At present there are some provinces where no government middle school is provided.

The improvement of the drainage system and others is also planned. The authorities have been seeking improvement of facilities for the clearing of waste land and for irrigation, and they propose to perfect these facilities on a larger scale than before, in view of the rapid increase of the population of the peninsula. Among the new enterprises contemplated is the improvement of railway communication by the building of a line between Heijyo and Genzan. The authorities also propose to extend the harbour of Genzan.

On the revenue side of the proposed Korean budget, the authorities are asking for a subsidy amounting to Y.20,000,000 an increase of Y.5,000,000 over the figure paid out from the national treasury for the present year. In the event of the home authorities refusing to meet the requirements of the Korean government, it is believed that the latter will be compelled to raise the balance by floating a domestic loan.

Port Scheme at Harbin.—The opening of Cunalho at Harbin as commercial port has been taken up by the government. The town is favorably situated on the southern bank of Sungari River opposite Sung-kiang-chen. It is reported that a series of schemes including the construction of four main roads and 17 branch lines and establishment of four police stations has been drawn up by Mr. Chang Tseng-ju who is likely to be appointed director of the new port work bureau to be soon established.

Public Works, Osaka.—Osaka has just announced a most ambitious plan for the improvements of its roads and other civic works. According to a tentative plan prepared by the Osaka planning commission, the work will be extended over a period of seven years with expenditures of approximately Y.140,200,000.

Owing to the fact that more than half of the present fiscal year which is from April, 1921 to March, 1922 has elapsed, it is proposed by the committee to spend only Y.7,015,000 this year to be dispersed as follows: Y.5,317,722 for the expansion and construction works, Y.1,169,180 for the repair of the present roads and Y.528,098 for the readjustment of roads.

It is proposed by the committee to float a municipal loan of some Y.75,000,000 to be redeemed in 50 years. It is also hoped to obtain Y.35,000,000 as a subsidy from the central government, the rest of the fund being raised by increasing the municipal taxes for amusement, entertainment, automobiles, rickshas, bicycles, motorcycles, wagons and various other vehicles. It is also intended to increase the city tax now being levied upon the local tramway lines. Besides, the scheme is primarily intended to improve and expand the roads it is also projected by the city planning commission to improve the city's sewer system, the hygienic plants and other civic improvements along the permanent scale for the future of this greatest commercial and industrial metropolitan city in the Japanese empire.

Tunnel Through Laotsoshan.—The work of constructing a tunnel through Laotsoshan this side Ryojun (Port Arthur) on the new Dairen-Ryojun road was taken in hand on the first ultimo, and will probably be completed through by the end of next spring.

Reduction of Public Works Expenditures Manila.—City Treasurer Alfonso has proposed the reduction of the public works expenditures as follows: Cementerio del Norte, from P.480,000 to P.180,000; barrio obrero from P.500,000 to P.250,000; installation of public hydrants in Malate, Sta. Cruz and Tondo, from P.250,000 to P.190,000. The projects whose allotments were not touched are those for the Prime bridge, P.102,000; Nueva Era bridge, P.30,000.

Tokyo's Sewerage Construction Projects.—For many years past the city of Tokyo has been working on the construction of a sewerage system, sections of which are practically complete. Plans have now been approved for further construction work which may extend over sixteen years, and cost about Y.20,000,000. This work will include

the installation in Kyobashi, Nihonbashi and parts of Kojimachi and Shibla wards. A large trunk line will begin at a point known as Shibasosobashi in Shiba and traverse the Ginza street, along which lies the main shopping centre. Another line will begin at the Nijubashi gate of the imperial palace and, traversing Hibiya Park along the street car lines, will discharge into Tokyo Bay at Shibaura. This line will be of concrete and will measure 12-ft. across. As a temporary measure, sewerage from Kand, Ushigome, Azabu, Akasaka and Shiba wards will be released through this line.

Extended Fire Alarm System Being Planned, Tokyo.—Extension of the fire alarm system in the streets of Tokyo is soon to be carried out by the Tokyo Fire Brigade at the instance of Mr. Ogata, chief of the brigade. Mr. Ogata has just returned from a tour of the United States and Europe where he studied metropolitan fire departments. The proposed extensions contemplate an increase of fire alarms from 76 to 3,000. The apparatus is to be of the latest type. Installation in the suburbs also is planned, it is said.

Public Works, Kwangsi.—The civil governor of Kwangsi has drawn up regulations for road construction, stipulating that a city road averaging 50 *li* in length should be built in each district every year. At this rate a total of 4,500 *li* can be completed every year. The magistrate in such district will be responsible for construction of city streets while the main roads will be built by the provincial government. It is also planned that a railway from Wuchow to Pai-suh will be built with foreign money and negotiations for railway loan are carried on with foreign capitalists.

The civil governor is also greatly interested in developing the mineral resources of Kwangsi. The tin and coal mines at Nan-tan and Foo-woo have been already operated by the provincial government while the opening of manganese mine at Wu-hsien and copper mines at Tung-an and Yung-fu is under contemplation. For industrial development, a series of schemes has been formulated including tanning hides, spinning cotton, casting iron, refining sugar and manufacturing camphor.

RAILWAYS

Chengchiatun Railway Extension.—The rails are to be laid as far as Paiyintala on the Ssuping-kai Taonan Line during November.

From the 23rd, construction trains are being run from Chengchiatun to Chienchiatien.

Ching Yu Railway.—The conference of Chinese chambers of commerce at Shanghai on October 26th, passed resolutions requesting cancellation of the French contract for the Chingyu Railway and mining rights in Kwangtung, Kwangsi and Yunnan.

Short Railway, Woosung.—According to the *Shanghai Journal of Commerce* the Woosung commercial port bureau is planning to establish a short railway line between Wangchupang and Taihsingmiao bridge. It is stated that the line is being established for the purpose of facilitating the business of the Great China Cotton Mill, of which Mr. C. C. Nieh, chairman of the Chinese general chamber of commerce, is proprietor. The line will be three and a half miles long.

New Korean Railway.—The light railway bee tween Chochiwon and Chongju, capital of North Choongchong province, 14 miles in length, is now finished and the inauguration ceremony will take place on November 1.

Manila Railway Pays Dividend.—The Manila Railway (1906) has declared a dividend of 5 per cent. on preference and 5 per cent. on ordinary shares; balance forward £8,788. This is the first fruits of the reorganization of the company.

Proposed Railroad Between Kwangtung and Kwangsi, China.—A railroad connecting Kwangtung and Kwangsi is now planned by the authorities of the two provinces. The plan was proposed by Dr. Ma Chun-wu, governor of Kwangsi, who considered that by building the line the transportation in Kwangsi will be greatly facilitated and the industrial and commercial conditions of the two provinces will also be improved.

Transportation Facilities in Jehol.—With a view to facilitating the means of transportation between Jehol and the different parts of Fengtien, General Chang Tso-lin is planning the construction of a branch line connecting certain places in Jehol with the Peking-Mukden Railway at Chingchow. Another line will also be built connecting Chaoyang, an important centre in Jehol, with Chingchow. A section of the new line between Chingchow and Yichow has been opened to traffic.

Canton-Hankow Railway.—The construction of the Canton-Hankow railway, originally intended to start in the middle of the year, has been postponed until February, 1922, owing to political troubles in Szechuan and Honan. In the meanwhile, negotiations for a loan are proceeding with the Chung-Yin Syndicate for the construction cost of the Chuchow-Hungchow section.

Chefoo-Weihsien Railway Get American Loan.—It is reported that when the construction of the Chefoo-Weihsien railway was on the point of interruption, the Washing Co., an American firm, secured a contract for the continuation of the work at a cost of $18,000,000. The contract was signed by Messrs. Wang Ngao-kwan and Lien Ying-wang on behalf of the railway and Mr. Conspan representing the Washing Co. The following is a summary of the principal points in the agreement :—

(1) Rails, locomotives, wagons and other railway materials and rolling stocks for the Chefoo-Weihsien railway shall be exclusively supplied by the U. S.

(2) Before the signing of the contract, the railway shall get an international bank to guarantee payment.

(3) The railway line is to be divided into three sections with the first 75 miles long, second 40 and third 100. Payment is to be made in installments within six years after the completion of each section.

(4) In case of prolongation or construction of branch lines, U. S. shall be first dealt with, and without obtaining U. S. permission China shall be restricted from making any contract regarding the railway with any other foreign powers. In the event of any breach of the above provisions, China is liable to pay a fine of $50,000.

It is obvious that the above agreement is more a loan contract than a construction contract, especially in article four.—*Chinese Press Report.*

Electrification of Japanese Railways.—The official system for the electrification of the railways of Japan has recently been revised and a new electric bureau established. According to the plan now being worked out by the department of railways, the first steps will be to electrify the entire Tokaido line, whose traffic has been increasing enormously each year, from Tokyo to Kobe, and a part of the central line between Iidamachi station in Tokyo and Kofu, in the rear of Mount Fuji, where many tunnels make transportation slow. Electric trains will be used exclusively for passengers, freight trains being propelled by steam as at present.

Chingchow-Jehol Railway under Construction.—According to a telegram from Peking, the section from Chingchow to Nee-chow on the Chingchow-Jehol railway, about 120 *li* in distance has been completed and traffic between the section was inaugurated on November 10, 1921.

Chinese Eastern Railway Finances.—Mr. Sung Shiao-lien, director of the Chinese Eastern Railway, will issue bonds authorized by the shareholders' meeting, to the amount of $30,000,000 to be devoted to purchase of rolling stock, paying back salaries and maintenance expenses. A portion of the fund will be set apart for raising new troops to guard the railway.

Chinghsien-Jehol Railway Proposed.—The ministry of communications is considering the suggestion made by the authorities of Fengtien for the construction of a railway from Chinghsien to Jehol.

British Loan Reported.—It is rumored that the ministry of communications is attempting to make a loan with the Sino-British Syndicate amounting to $8,000,000 on the security of the surplus of Peking-Mukden railway. The fund is to be used for building a branch line on the Peking-Mukden railway, from Ching-chow to Chao-yang, and constructing a harbor for another railway.

Railway Shops, Japan.—The Government Railways of Japan have completed two new shops, one at Kagoshima and the other at Suida, Osaka. The Kagoshima shops will repair cars on the Southern lines in Kyushu. The Suida plant will take over part of the work assigned to the old shop in Osaka.

Kiangsi Railway.—The provincial government of Kiangsi has secured the sanction of the Peking government for the raising of eight million dollars domestic loan with the wine and tobacco receipts of this province, the stamp tax and one or two other local taxes as security chiefly for the repayment of the Japanese loans to the Nanchang-Kiukiang Railway Company. In default of payment, Japan will assume control of the line next year.

Harbin-Heiho Railway.—With regard to the construction of the Harbin-Heiho railway, the tuchun of Heilungkiang, promoter of the line, has telegraphed to General Chang Tso-lin reporting that a fund of $2,000,000 has been raised in his province and asking him to appropriate a large sum as there is still a great deficiency. A similar telegram has been sent to the government asking for fund.

Light Railways for Mongolia.—The ministry of communications has decided to build three light railways on the north border of China—from Hsuan-hua to Kwan-hua, from Kalgan to Urga, and from Jehol to Chi-feng, definite measures for the construction having been laid down by the ministry.

Traffic Opened on Chinghsien-Chaoyang Line.—Traffic on the Chinghsien-Neehsien section on the Chinghsien-Chaoyang Railway, a branch of Peking-Mukden Railway, was inaugurated lately.

Fushun-Shinching Light Railway.—According to report from Mukden, the construction of a light railway from Fushun to Shin-ching is under contemplation.

Light Railway Urged.—Mr. Tsao Jui, civil governor of Chihli, has wired to the government requesting to send experts to survey the proposed light railway on Shun-lung-shan Mountain.

The Mikawa Railway Company, Japan, has been granted a charter for the extension of its steam line by 9.41 miles to connect Sanage with Asuke, towns in Aichi prefecture.

Special Coaches for Prince, Japan.—The department of railways has decided to construct two special coaches for the use of the prince of Wales during his visit to the country. One will contain a dining room and a compartment for members of the royal suite. The coaches will be constructed at the Oi car shops at an estimated cost of Y.220,000.

Light Railway Project.—Tsao Kun has addressed communication to the Chiaotungpu requesting it to appoint several railway engineers to survey the Hsinglungshan route for the erection of a light railway to facilitate transportation of military necessities.

Kalgan-Kiakhata Railway Proposed.—With a view to facilitating communications, General Chang Tso-lin has telegraphed to the central government suggesting the immediate construc-

tion of the Kalgan-Kiakhta Railway, an important line for military service, which was taken up by the government some time ago. The ministry of communication is considering the suggestion.

Locomotives Ordered Ready for Shipment to China.—It is reported that the forty seven locomotives ordered from U.S. by Peking-Suiyuan Railway Administration have been fully completed and are now ready for shipment to China. Of the shipment seven are the largest over exported from America, each weighing 320 tons.

Chinchow-Chaoyang Line.—The new railway section, about 30 miles long, from Chinchow, on the Peking-Mukden line, as far north as Yichow, was completed at the end of last month and opened to traffic. By next year, the line is to be extended to the intended terminus at Chaoyang. This new section has been planned principally to carry the outputs of Hotien Colliery operated by the Peking-Mukden Line. A further extension into Inner Mongolia looks possible. It is also possible that the output of the Hsinchiu Colliery, operated under Sino-Japanese joint management, will also be transported by the new section. At all events a rosy prospect lies before the new section and this is thought to strengthen the chances of the much-talked-of reconstruction of Lienshan (Hulutao) Harbor (south of Peitaiho) in no distant future.

Railway Rolling Stock Held Up.—A large quantity of railway rolling stocks purchased by the Peking-Suiyuan Railway Administration has been held up by the customs, owing to customs duty amounting to $360,000 not having been paid.

New Minister of Communications, Chita.—In succession to M. Shaatoff (minister of communications of the Far Eastern republic), M. Milaekoff has been appointed. He has once served as a commissioner despatched to Amur province.

New Locos, Shanghai-Nanking Railway.—The Shanghai-Nanking Railway has received thirteen new locos manufactured by the North British Locomotive Company, Ltd. The cars were purchased through Jardine, Matheson and Company, Ltd. of Shanghai.

Canton-Hankow Railway Survey Stops.—The Canton-Hankow Railway officials have received instructions from Peking to suspend the surveying work on improvement of the location of the line south of Chuchow to the border of Kwangtung province, on account of lack of funds.

The surveying party has been recalled to Hankow where they are preparing and reports of the surveys on the Chuchow-Heugchow section already completed.

Cox Retires.—Mr. A. G. Cox, engineer-in-chief of the Canton-Hankow Railway is retiring from the Chinese government service, and will probably return home to England for a time. Mr. Cox is one the oldest foreign engineers in the railway service of the Chinese government, having served a term of more than thirty years as engineer on different government railways in China. Pending the appointment of a successor, Mr. J. H. Williams, the district engineer, will most probably act as chief engineer of the line. —*N. C. Star.*

Kin-Han Loan?—The Chinese press announces that General Wu Pei-fu has offered the Kin-Han Railway as security for a loan of $5,000,000 to be negotiated with a certain American firm. The report states that this plan has been supported by Marshal Tsao Kun.

Cable Car Line, Japan.—The construction of the cable car track between Gora Park and the foot of Sounzan mountain in Hakone has been nearly completed. Service is expected to begin before the end of this month. The line which is the first cable car service in Japan is 15 miles in length and forms part of the railway system on the Hakone mountains conducted by the Odawara Electric Railway Company.

Shimonoseki Tunnel.—Official announcement has been made by the Japanese railway department of the completion of the plan of the proposed Moji-Shimonoseki Tunnel. The work will be taken in hand from the beginning of the next fiscal year in April 1922. The tunnel will be constructed between Moji and Hiroshima island. The distance between the island and Shimonoseki will be spanned by an iron bridge. The Kyushyu end of the tunnel will be to the west of Dairi, some three miles from Moji.

Chungking Expansion.—A special commissioner and staff have been appointed to work on a plan which, if realized, will make Chungking one of the biggest commercial ports in China within ten years. The scheme will include the expansion of the present municipality to many miles beyond the southern bank of the Yangtze river, the institution of a tramway service and the maintenance of several boats. Several million dollars will be necessary to carry out this scheme and many prominent bankers and rich oversea Chinese have been invited to make investment.

Railway to Kelantan.—On November 1, through service between Kuala Lumpur and Kelantan will be established. The railway line between Padang Besar and Kota Bharu had been contemplated some time ago, but there were certain minor details which had to be perfected. It is now proposed to start the service with one train a day each way, every day of the week excepting on Sundays. The service will commence from Alor Star at 6 a.m. and will be through Padang Besar, then through the section of Siamese state railways, to Kota Bharu and then to Tumpat on the Kelantan coast. This journey will take in all 13½ hours. Visitors to Kelantan will only be able to see the new country that is opened on their return journey which will commence at 6.10 a.m. from Tumpat, reaching Alor Star at 7.35 p.m.

Railways for Celebes.—News comes from Macassar to the effect that the line from there to Takalar viâ Sunguminassa is making great progress. The chief engineer of the states railway department, Mr. Popping, is a very energetic man, with a practical outlook. The contractors, Volker, Hondijk & Co. keep the work going at full speed as long as there is daylight and are making good progress. But it has cost a great deal of time and trouble to get rolling stock from Java, and sand, sleepers, rails and other materials. Now, however, these have arrived, and everything possible is being done to push on the work.

The Jason belonging to the Blue Funnel Line and the Sommelsdijk of the Holland-Amerika Line have between them been unloading 7,000 rails from New York, each ten metres long, so that in a week's time something like three kilometres will have been laid down and the work pushed on further.

Railway Construction in the Outer Possessions—According to the *Bataviaasch Nieuwsblad* the governor-general has granted the concession requested for the building of a railway in South Borneo. As soon then as the necessary papers are ready the work will begin.

With regard to railways in Celebes, first consideration ought to be given towards constructing a line between Macassar and the Boni Plain; but this will not be practicable as long as Pare Pare remains the shipping port for that district.

A line between Pare Pare and the Boni Plain would not be profitable, while to build one between Macassar and Pare Pare is not to be thought of.

If those interested could be persuaded to relinquish Pare Pare as a port, then a line between Macassar and the country beyond might be taken into consideration.

The companies have also cast their eyes on Bali and Lombok. From an economical standpoint, Bali could certainly do with a railway, but as the technical difficulties are very great, little is likely to come of it.

The rivers run at right angles to the line along which the railway would be laid : there are a good many of them too, and most of them are very broad ; so that the building of a railway would necessitate the making of many costly bridges. On these grounds then a railway would at present be quite out of the question.

Mukden Arsenal Light Railway.—The Mukden arsenal will construct a light railway to the Mukden station. The work will start next spring and funds provided by the provincial treasury.

Harbin-Heiho Railway.—It is rumored that the Chinese authorities have promised American and Russian capitalists to invest money with Chinese in the construction of the long proposed Harbin-Heiho railway and that negotiations regarding the joint enterprise are proceeding at present.

RIVERS, HARBORS, WHARVES AND DOCKS

Hongkong Harbor Scheme.—It is reported that Mr. William Chatham, C.M.G., M.I.C.E., former director of public works in Hongkong, who left for Home on retirement towards the end of last year, will shortly return to the Colony to take complete charge of the big harbor scheme planned by Sir Maurice Fitzmaurice, member of the well-known firm of Coode, Matthews, Fitzmaurice, and Wilson, consulting engineers for harbors to the Crown Agents for the Colonies. Mr. Chatham's local public works experience dates from 1890 when he arrived in the Colony as an executive engineer to join the government department.

American Coaling Crane for Dairen Wharves.—One of the four coaling cranes ordered from the United States has already arrived at the Dairen Wharves, the other three being expected there during the rest of the year. It is capable of loading 100 tons of coal in an hour.

New Dockyard for the Kiangnan Dock & Engineering Works.—It is reported that the ministry of navy has made a first appropriation of $100,000 to the Kiangnan Dock and Engineering Works for the construction of a new dockyard which calls for a total expenditure of $600,000 and that the work of construction will be actually carried out on the first of November, 1921.

Yangtze Conservancy Association.—The Yangtze conservancy works association with five different departments, general affairs, investigation, surveying research and financial—has been established at Nanking by members of the Kiangsu provincial assembly, and circular telegram has been dispatched to Hupeh, Kiangsi and Anhwei for co-operation to improve the mighty river and its tributaries.

Sourabaya Harbor Works.—In connection with the harbor works at Sourabaya, it has been found necessary to build more wharves at a cost of 50 million guilders. The work will be finished about 1928. New roads and godowns in the harbor area are estimated to cost about 10 million guilders. These should be completed in 1925. Work will also be continued on the harbor at Samarang. The erection of godowns and other improvements at the harbor are expected to cost about 4 million guilders. The work should be finished by 192[illegible]. It is calculated that the harbor work at Belawan will cost another 22 million guilders, and it has been decided to spend a sum of 1½ million guilders on dredging alone. The building of godowns, coolie lines, etc., is computed at 2 million yearly.

Liaoho Conservancy.—The ministry of finance has addressed a communication to the national revenue administration asking it to release the sum of $200,000 required for the Liaoho conservancy work.

Whangpoo Conservancy Board—Tenders for Stationary Pumping Plant.—The time limit for receiving tenders invited by this board's Notification 106 is advanced from the advertised date October 30, to noon November 15, 1921, by H. von Heidenstam, engineer-in-chief.

Rangoon Port Development.—The newly created Rangoon Development Trust has recently [illegible]

mitted the proposed plans for developing the port of Rangoon. No detailed plans have been approved as yet, and the scheme has only been provisionally approved, the intention being to afford an opportunity to the general public interested to offer suggestions, which will be carefully considered before the final details of construction are decided upon. The plans include docks and a dry dock; 2 basins with 15 berths and provisions made for extension to 7 basins, giving altogether 48 berths; wharves to be equipped with modern plant for handling traffic; direct railway connection into the docks for passengers and goods, together with lines of godowns and storage plants on each side of the tracks; ground to be set aside for industrial sites within easy reach of the railway and wharves; a passenger station to be erected near the dock entrance, whence communication may be effected with the Rangoon central station and uptown traffic; and a broad motor road to approach Rangoon over a new bridge 100 feet long. These improvements will offer splendid facilities for the growth of trade of Burma.

Yangtze Conservancy.—The Yangtze conservancy committee which has been organized by Messrs. Chang Chien, Han Tze-shih and Wang Tan-kwan for improving the river and its tributaries and preventing further deterioration, has sent a circular letter to nine neighboring districts in Kiangsu, inviting them to appoint representatives to attend the meeting to be held on November 9 at Nantungchow.

Yangtze Conservancy Society, Nantungchow.—The Lower Reach Yangtze Conservancy Society of Kiangsu met on November 10 at Nantungchow. According to estimate, the expenditure in surveying will call for $130,000 with a 2 per cent. reserve fund amounting to $26,000, in training works, $8,000,000; and in building embankment on both sides of the river, $1,900,000. The fund for the purpose will be drawn on the customs surtax, famine surtax, land tax and value of tidal lands, the balance being provided by the famine prevention commission at Peking.

Tsining Port Work.—It is estimated that the opening of Tsining, Shantung, as a commercial port will call for an expenditure of $1,000,000 of which $300,000 will be subscribed by the government authorities while the remainder, $700,000, will be raised by soliciting subscription among Chinese merchants, $500,000 being expected to obtain from Shanghai and Tientsin and another $200,000 from the province of Shantung.

Lungkow to be Opened as Naval Harbor.—With a view to strengthening the naval force the ministry of navy is planning to open Lungkow, Shantung, as a naval harbor. The matter will be soon discussed in the cabinet meeting.

Chinghokow Port Loan.—The *Sinwanpao* reports that the provincial assembly of Chihli is again negotiating with a certain American firm about the loan to build a port at the mouth of the River Ching.

Kawasaki Plans New Ship Yard.—An application has just been sent in to the authorities from the Kawasaki Dock Company in Kobe asking for a permission to reclaim some 600,000 *tsubo* of land near Kokura on the island of Kyushu. It is intended by the company to build a large shipbuilding yard. The capacity of the new dockyard now under contemplation will be so large that a merchant or war vessel of any size now afloat will be accommodated there. The place where the reclamation work is to be carried out is close to the new spacious Kokura harbor and the Asano Steel Works. Several million yen will be required to complete the reclamation work.—*Japan Advertiser.*

Tokyo Harbor Works.—The municipal authorities of Tokyo are reported to have decided to construct a harbor at the estimated cost of Y.350,000,000.

The features of the proposed scheme are reclamation of 300,000 *tsubo* of land for warehouses, etc., and accommodation for 40 vessels of 2,000 tons.

Despite the fact that rumours of commencement upon harbor construction have often been circulated before the present reports bear some marks of authenticity. It is said in certain circles that a formal announcement of the plan may be expected at an early date.

New Dockyard for Fusan.—It is rumored that a dock yard will shortly be completed in Korea under the protection of the Korean government general. The site chosen is in Fusan harbor. As there are 94 vessels registered with the Korean government general for licenses to trade along the coast of Korea, and as they were all obliged to come to Japan for repairs, it is hoped that the new dock will be a decided advantage to Korean shipping. Prominent men, in Korea and Japan also, are interested in this project, and about 80 per cent. of the work is already completed on 10,000 *tsubo* of land at the entrance to Fusan harbor.

The Keelung Dockyard.—The Keelung Dock Company of Keelung, Formosa, has been engaged to its full capacity for the past two months. Eight ships have been repaired since August 20, and work on six new steamers has been going on in the yards at the same time. So crowded has the work been that two and even three small steamers have been put into one dock.

The dock company has a monopoly of the business in Formosa, and the result of operations so far has been most gratifying to the shareholders, and to the shipowners as well.

Formerly vessels in the Formosan trade were all sent to Hongkong for repairs. It now costs, in Keelung, Y.3,000 less to overhaul a steamer than in Hongkong, says the *Japan Times.*

Fund for Training Grand Canal.—Reporting on the present situation of the grand canal, Mr. Chang Chien requested the government to immediately appropriate a fund of $500,000 to build embankments at important points on the river.

Five Million Pesos Asked for Improvement of Manila Harbor.—The *Manila Times* states that P.5,125,000 have been requested by the director of public works of the insular government for the dredging and improvement of the Manila south harbor during the coming year. According to one of the department secretaries, this matter was discussed by the council of state, but no decision on it was taken.

It was explained that according to the project submitted by the director to the secretary of commerce, the plan is to develop a quarry in Mariveles from which the material may be obtained to close the gap in the Manila breakwater and have the entrance fixed further south. Part of the sum will be used also in the construction of cargo sheds and in the completion of pier 7.

The sum asked for, if released, will be obtained from the P.12,000,000 received by the government as a result of the sale of port works bonds in the United States last year, it was declared. This money is at present lying idle.

According to a previous report made by Mr. Paez to the department of commerce and communications the closing of the present gap in the breakwater of the port is necessary to prevent the waves caused by the south-eastern wind from interfering with the loading and discharge of cargo of vessels lying alongside the piers. It is believed that by removing the present entrance further south, the waves will not move the vessels enough to obstruct the handling of cargo.

The construction of cargo sheds is likewise urged by the public works director in order to facilitate the handling of merchandise at the piers. With the increasing volume of trade of Manila, he believes that the early completion of pier 7 is of paramount importance.

Secretary of Finance Barretto is expected to submit his report on this subject at the next session of the council of state.

SHIPBUILDING

Concrete Lighter Built in Hongkong.—A very interesting launching took place at Hunghom on October 18, when at the shipyard of Messrs. Brossard Mopin the first re-inforced concrete powered lighter built in the Colony of Hongkong took the waters.

New Battleship, Japan.—The new Japanese battleship *Kaga*, now under construction at the Kawasaki Dockyard, is to be launched on the 17th of November. She is one of the largest and most powerful vessels built for the navy, being 715-ft. in length, with a breadth of 106-ft., a draft on an even keel of 30-ft. 9-in. and a displacement of 39,900 tons. The *Kaga* is to be fitted with 12 water tube boilers, driving four sets of turbines. Her estimated speed is 26.5 knots per hour. The armament will consist of ten 41-centimetre guns and twenty 14-centimetre guns.

Japanese Government to Build Steamer.—It has been decided to build a vessel of the type of the *Taisei Maru* of the Mercantile Marine School at Etchuijma, Tokyo, at a cost of Y.90,000. This sum so to be appropriated at next session of the Diet, says the *Kokumin.*

Steam Launch Co., Proposed.—Mr. Yuan Chao-ching of Tzo-chuen, Shantung, plans to build four steam launches to run a service along Sing-Ching-Ho from Wang-tan-jao to Yang-kao-kiu via Wu-ho. An application has been made to the local authorities.

Steam Boat for Iron Mining Co.—The Yih Hua Iron Mining Co., Wuhu, operating the iron mines at Lung-chiar-shan and Tsan-ho-shan, Tong-doo-hsien, has a new steam boat to transport its own output to Ichang, Shanghai, Chinkiang, Woosung, Nanking, Anking, Kiukiang, Hankow, etc. The vessel is named *Yih Sui.*

Motor Boats in Japan.—Fishing vessels built during 1920 totaled 22,890. Of these, 21,305 have no motive power, while 33 are steam-propelled ships and 1,552 are equipped with motors.

The increase in the number of ships with motors is taken as a proof of the demand for large-sized fishing vessels along with the improvement and progress in the method of fishing.

New Ferry Steamers, Japan.—One of the three vessels to be used as ferry-steamers between Shimonoseki and Fusan which the Mitsubishi Dockyard in Kobe is building will be launched in the latter part of November, but will not be placed in commission before the middle of April next. She is of steel, displaces 3,650 tons and has a speed of 19 miles.

New Yangtze Steamer.—The steamer *Kungwo* built to the order of the Indo-China Navigation Company, was launched at the Kowloon Docks recently. She is modelled on the lines of the steamer *Loongmow*, but embodying improvements which will enable her to handle a cargo of heavy machinery.

Concrete Lighter Launched at Hongkong.—A very interesting launching took place at Hunhom, Hongkong, on the 18th instant, when at the shipyard of Messrs. Brossard Mopin the first reinforced concrete powered lighter built in Hongkong took the waters.

Wu Tung Navigation Co., Harbin.—The Wu Tung Navigation Company at Harbin has received a telegram from the ministry of communications instructing that more tow-boats should be built in order to expand its business. Mr. Ziar Ling-foo, manager of the company, has taken the matter up accordingly, sending representatives to Heiho to make purchase of materials for building additional boats.

Kiangnan Dock Loan.—Admiral Li Ting-hsin, minister of the navy, is reported to be offering the Kiangnan Dock as security for a loan of $5,000,000 from an American firm.

Shipbuilding Depression, Japan.—August and September each witnessed only one ship (exclusive of ships under 1,000 tons) launched throughout Japan. In August 7,300 tons took water at the Sakurajima Yard of the Osaka Iron Works and is named Yogen Maru and in September 1,300 tons was launched at the Ono Iron Foundry and named Dai-Jyushichi Ono Maru.

Shipbuilding, Japan.—Ships of 1,000 tons and up launched during October numbered three, with 5,750 tons, or an increase of two in number and 4,450 in tonnage, as compared with one, of 1,300 tons, launched in September.

The new ships are the *Gifu Maru*, 3,000 tons, built at the Toba shipbuilding yard, the *Urado Maru*, 1,250 tons and the *Murasaki Maru* built at the Osaka Iron Works to the order of the Osaka Shosen Kaisha.

During the last ten months, 38 ships with 196,915 tons were constructed in Japan. Compared with those built during the same period of last year, they show a decrease of 46 in number and 177,645 in tonnage.

TELEGRAPHS, TELEPHONES, RADIO, ETC.

TELEPHONES

Tokyo Telephones.—Of 4,550 telephones that are to be installed, the Tokyo authorities have received applications for 60,000 telephones. Of the 4,550 telephones which will be installed 500 are to be given to public utility associations and organizations, and the others will be settled by drawings.

Tsingtao Wireless.—Japan's new wireless station, situated on a low point at the southern end of Tsingtao harbor, will soon be ready for operation. It has steel masts more than 400 feet high and two wooden masts which are considerably lower. It will be able to receive wireless messages from all parts of the world and to send messages to any part of Japan or the Philippine Islands. Although intended primarily for the use of the military, Japanese officials in Tsingtao state that commercial messages will be accepted.

Telegraph Communications, Sinkiang.—At the request of General Yang Tseng-sing, tuchun of Sinkiang, telegraph wires will be provided from Harmi to Par-lee-kwen in Sinkiang by the ministry of communications.

Tsinanfu Telephones.—The Tsinanfu Telephone Company has increased its capital and requested registration at Peking.

Antuug Telephone Company.—The Antung Telephone Company, conducted hitherto by Chinese merchants, has been reorganized, as approved by the ministry of communications, under joint management of officials and merchants.

Tsinan Telephone Co. Re-organized.—It is reported that the Tsinan Telephone Co., Shantung, has been re-organized and a new registration will be made with the ministry of agriculture and commerce.

Harbin-Vladivostok Long Distance Telephone.—The Chinese Eastern Railway, Harbin, agreeing to a proposal made by the Chinese there, is planning to lay a long distance telephone between Harbin and Vladivostok with the object of extending better facility to the produce dealers and forwarding agents.

TRAMWAYS

Tramways for Harbin.—It is reported that the concession for the construction and management of a tramway system at Harbin has been secured by the China Electricity Co., which firm is said to have entrusted the construction work and management of the new tramway service to the Harbin branch of a San Francisco concern, and the contract was formally signed some days ago.

Woosung Tramway.—Chang Chien, superintendent of the Woosung port development bureau, telegraphs that the Woosung Electric Company is raising the sum of $700,000 for the inauguration of a tramway service at Woosung and requests the chiaotungpu to approve the application of the company for registration.

Peking Tramway Co. in Progress.—It is reported that the capital of the Peking Tramway Co. in merchant shares has been fully subscribed while for the government shares the ministry of finance has successfully raised a fund of $500,000 from five Chinese leading banks at Peking. Registration of the company has been officially made with the ministry of agriculture and commerce.

Chinese Tramway, Double-Tracked.—It is reported when the road at Van-kwan-jao has been extended in width, double track tramways will be laid out at that point by the Shanghai Chinese Tramway Company.

Peking Electric Tramway Company.—The ministry of agriculture and commerce has authorized the charter of the Peking Tramway Company and notified the governor of the metropolitan district to this effect, as the sphere of the Company's future operations is under the jurisdiction of the metropolitan authorities. Immediately on receiving their charter, the company issued the following public invitation:—"Specifications for power house machinery, rails, rolling stocks and workshop equipments are now on preparation. Only a limited number of tenders will be invited. For the sake of selection by the said company, firms are requested to send their names in early together with illustrated catalog of their manufacturers to the above company, 16 Chuan-pan hutung, Peking."

Harbin Tram Contract.—The Chinese capitalists who obtained a concession for building a tramway and electric plant at Harbin have handed over their rights to the representative of the American firm of Bekmann and Linden.

Tramway Proposed in Chapei.—A scheme has been formulated by the gentry of Chapei for laying down tramway tracks on Kung-woo Road and Paoshan Road starting from Sinza Bridge, with farther extensions into neighboring localities.

Eight New Rail Lines are to be Given Franchise, Japan.—Many applications have been received by the Tokyo prefectural authorities for franchise for constructing underground and other electric railways. It is reported that the authorities have decided to grant franchise to the following eight lines:

Tokyo Underground Railway, Shinagawa to Asakusa; Musashi Electric Railway, Hibiya to Yokohama; Tokyo High Speed Railway, Shinjuku to Otsuka, via Kanda and Hibiya; Suburban Service, Meguro to Tamagawa; Ikegami Railway, Omori to Meguro; Seibu Railway, Yodobashi to Kawagoye; Keio Electric Railway, Hatagaya to Tamagawa; Tamagawa Railway, Meguro to Shibuya.

A Borneo Tramline.—The first section of the tramline from Bandjermasin to Martapura and Banjuhirang (Borneo) by the Samarang-Joana Railway Company has been opened.

The Oji Electric Tramway Company will propose the doubling of its authorized capital to Y.6,000,000 at a semi-annual meeting in December. With this increased capital the company plans to extend its service in the suburb of Tokyo.

WATERWORKS

Waterworks, Chinkiang.—A waterworks has been established at Wushihsunyu, Chinkiang, by the British municipal council.

Chinkiang Waterworks.—The organization of a waterworks in Chinese territory at Chinkiang as proposed some time ago by Mr. Chu Chung-fu is being accelerated by the subscription of $200,000 capital.

Waterworks Enterprises in Shantung.—The Weihsien Waterworks Company (濰縣自來水公司) organized by Mr. Sze Kung-ming (史耕民) and others recently petitioned the ministry of agriculture and commerce for registration.

The Electricity and Waterworks in Haichow will be under the management of the Haichow municipal administration.

Artesian Wells, Sunkiang.—An artesian well company with a capital of $10,000 has been organized by Hsu Shih-tse at Sunkiang, Kiangsu.

Hydraulic Wells.—Hsu Shih-tse and others propose to organize a Hydraulic Wells Construction Company in Sunkiang with a capital of $10,000. Its temporary offices are in the Sunkiang Electric Company.

Nanking Waterworks.—Shanghai capitalists are organizing a company with $600,000 capital to operate a waterworks at Nanking.

New Reservoir, Dairen.—The construction of a new impounding reservoir at Lungwangtang for the further extension of the Dairen Waterworks is making good headway. It will take four years to complete the work. Already 40 per cent. of it has been finished. The embankment has been constructed to the height of 50 ft. It is to be 100 ft. high when finished. 800 coolies are at work, and it will be pushed forward throughout the winter. The piercing of Nanking Hill with a tunnel for the purpose of leading the forcing pipes through was started on October 5 by the Oriental Road-Building Co., Tokyo, which has secured the contract.

Water Supply, B.N.B.—The Tawan water supply installed by a local company operating as Chop Sheu Lee has been working satisfactorily. The water from underground springs is collected in a well and pumped up to a reservoir on high ground by a Homsby pump capable of dealing with 2,500 gallons an hour. From the supply reservoir the water gravitates for half a mile into the town delivering a supply of fifteen gallons a minute.

WIRELESS

U.S. Wireless in Alaska Connects with Japan.—The United States naval station at St. Paul in the Pribilov Islands, Alaska, has established direct communication with Japan. The station is not yet open to commercial business, but it will handle some Trans-Pacific communication, which will be increased by the conference at Washington.

Woosung Wireless Extension.—The Chinese wireless station at Woosung established seven years ago has found its present premises too small and improvements are contemplated.

Wireless Telephones, Shantung.—The military governor of Shantung has decided to install wireless telephones at Chefoo, Tsining, Tungchow and Wayming and Tsinan for military use in case of breakdown of wireless.

Wireless Telephone.—Batavia and Samarang (Java) are about to be brought into wireless telephonic communication with Padang (West Sumatra).

Direct Wireless to Japan.—The United States naval radio station at St. Paul, Pribilof Islands, off Alaska, has established direct communication with wireless stations in Japan. Although not yet open for commercial messages, it is understood that the new route will take up some of the intercontinental communication demands which will shortly be increased by the armament conference.

The St. Paul station is expected to prove invaluable as a reserve communication route in the event of a break in the transpacific cables.

CHIENMEN

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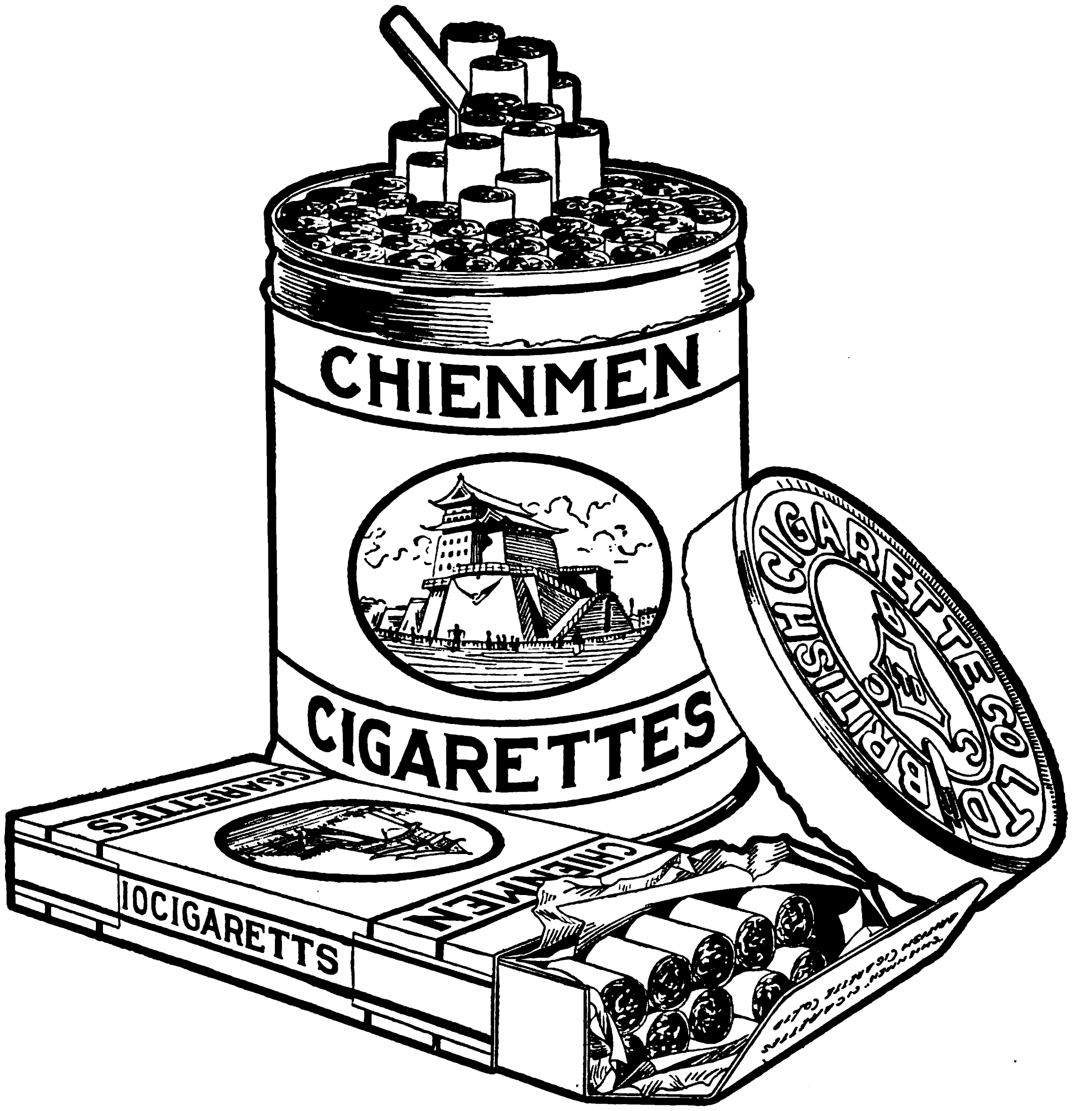

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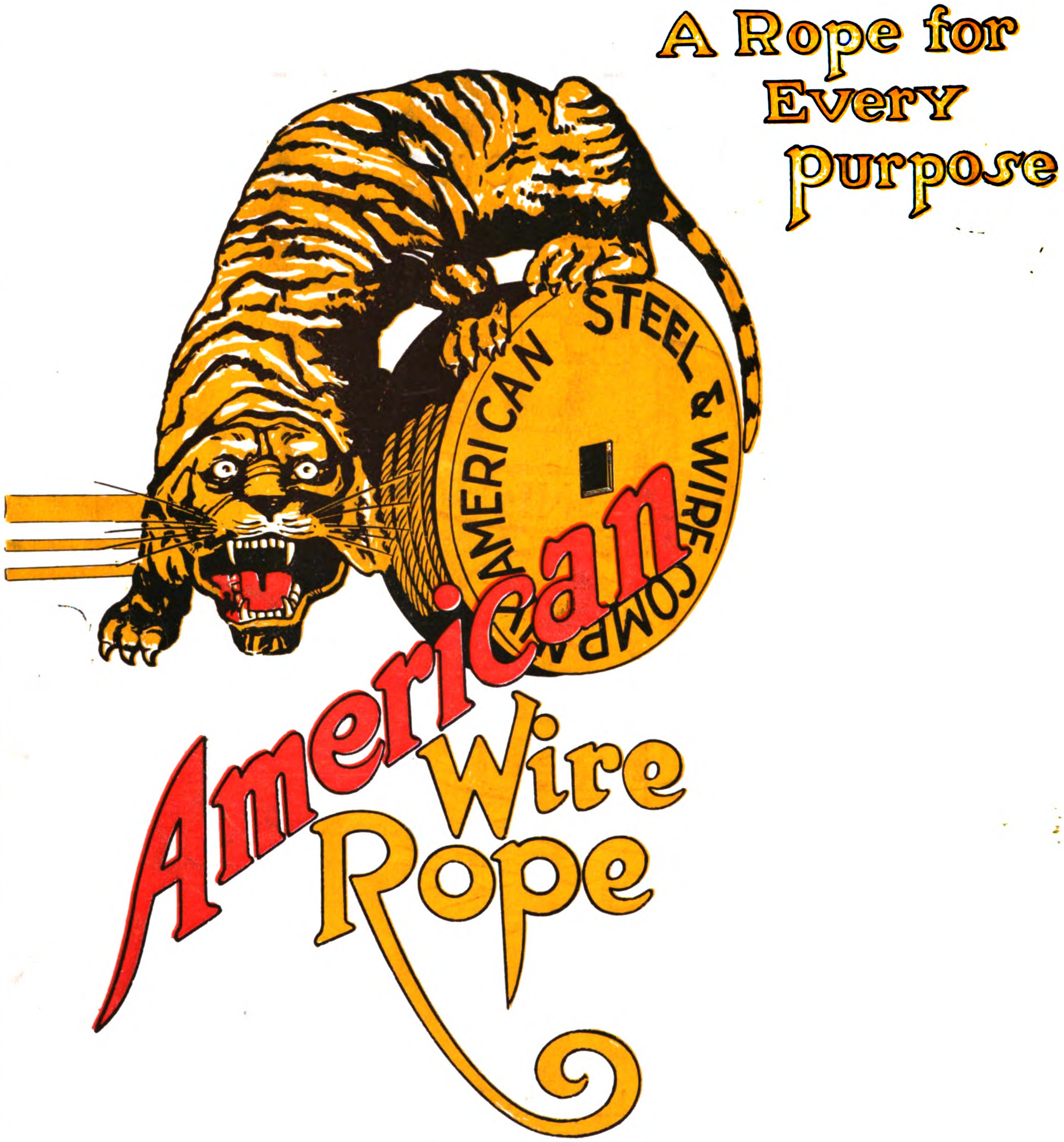

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